

**OPTING FOR C-SECTION VS NATURAL  
DELIVERY: UNDERSTANDING FACTORS,  
INFLUENCING CHOICES, PRACTICES AND COST**



Pakistan Institute of Development Economics

*Submitted By*

**Muhammad Adil Khan  
PIDE2019FMPHILHE02**

**Supervisor**

**Dr. Amena Urooj**

**Co-Supervisor**

**Dr. Fazal-e-Hakim Khattak**

**PIDE SCHOOL OF ECONOMICS**

**M.Phil. Health Economics**

**Pakistan Institute of Developed Economics, Islamabad,**

**Pakistan**

**2022**



Pakistan Institute of Development Economics

**Pakistan Institute of Development Economics, Islamabad**  
*PIDE School of Economics*

**CERTIFICATE**

This is to certify that this thesis entitled: "OPTING FOR C-SECTION VS NATURAL DELIVERY: UNDERSTANDING FACTORS, INFLUENCING CHOICES, PRACTICES, AND COST" submitted by **Mr. Muhammad Adil Khan** is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Health Economics.

Supervisor:

Dr. Amena Urooj

Signature:

Co-Supervisor:

Dr. Fazal-e-Hakim Khattak.

Signature:

External Examiner:

Dr. Tariq Mehmood Ali

Signature:

Head,

PIDE School of Economics: Dr. Shujaat Farooq

Signature:

## **Author's Declaration**

I Muhammad Adil Khan hereby state that my MPhil thesis titled “Opting For C-Section Vs Natural Delivery: Understanding Factors, Influencing Choices, Practices and Cost” is my own work and has not been submitted previously by me for taking any degree from Pakistan Institute of Development Economics or anywhere else in the country/world.

At any time if my statement is found to be incorrect even after my Graduation the university has right to withdraw my MPhil degree.

Date: **6/27/2022**



**Muhammad Adil Khan**

*Every challenging work needs self-efforts as well as guidance of elders  
especially those who are very close to our heart.*

*I dedicate my work to my loving Mother and Father,*

*Whose affection, love, encouragement and prayers of day and night make  
me able to get to such success and pride.*

## ACKNOWLEDGMENTS

Prima facea, I am grateful to Almighty Allah who continues to make the impossible possible, for the good health and wellbeing that were to complete this work and all the blessings He bestowed us with.

I offer my gratitude and appreciation to my supervisor Dr. Aameena Urooj and Co-supervisor Dr. Fazal-e-Hakim Khattak, for the deft ways in which they lovingly challenged, supported and guided me throughout the whole of this work, knowing when to push and when to let up. I also place on record, my sincere thankyou to Dr. Shujaat for extending research facilities of the department to carry out this work.

I also offer my special thanks to all the faculty members and respected seniors of “PIDE Department of Health Economics”, for their kind support and guidance in accomplishment of my work.

There are a number of people without whom this thesis might not have been written; I am greatly indebted to all of them. Loving thanks to my friends/ learning partners, Kainat Yousaf and Abdullah Israr who played such important roles along the journey, as we mutually engaged in making sense of various challenges we faced and in providing mutual encouragement to each other at times when it seemed impossible to continue our respective research work.

A special thanks to my family. Words cannot express how grateful I am to my parents for all the sacrifices that they’ve made on my behalf. Your prayers for me were what sustained me this far. I have been extremely fortunate in my life to have such family who has shown me unconditional love and support. Without your support and encouragement, it would have been impossible to complete my work.

I also place on record, my sense of gratitude to one and all, who directly or indirectly, have lent their hand in this venture.

*Muhammad Adil Khan*

## ABSTRACT

The Cesarean Section (CS) has become among the most common surgeries with the rates growing continuously in high and middle income countries. It has been evident from the most recent report of Pakistan Demographic and Health Survey (PDHS) that the rates of C-Section deliveries have rapidly increased from 14% in 2012-13 to 22% in 2017-18 in Pakistan. The current study aims to investigate the CS and natural delivery rates in tertiary hospitals (one public and two private) in Islamabad. We explore in this study the cost of two modes of delivery and examine the influencing factors related to the total cost of the childbirth in both CS and natural delivery. The results obtained showed that the rates of CS were 58% in public hospital and 73% in private hospitals as compared to natural delivery. CS rates were found to be high along with the associating factors such as women with high maternal age (>24 years), high socioeconomic class, women with high education and professionally stable and preference of private facility. The indications with higher frequency comes out to be abnormal /breached baby position, prolonged labor & failed Induction along with fetal distress and high BP/gestational diabetes and previous C-section, over age and psychological fear of natural delivery process for elective CS, emergency CS and CS on demand respectively. The cost and length of stay of CS were greater than those of natural delivery with significant difference ( $p < 0.05$ ). The variables such as age and length of stay were the influencing factors for both CS and normal delivery costs which had the value  $p > F = 0.0291$  which is less than 0.05 for public hospital and value  $p > F = 0.04$  which is less than  $< 0.05$  for private hospitals. Thus, comprehending that the CS rates were high than natural delivery in both public and private hospitals with the major factors significantly impacting the total cost comes out to be age and length of stay. It is therefore recommended that an upsurge in the overall CS rates needs to be controlled by implementation of strict departmental guidelines, design & development of comprehensive policies and design & implementation of community-based programs.

**Keywords:** Natural delivery, C-section, Elective CS, Emergency CS, CS on demand, Delivery Cost, CS indications, Policy.

# Table of Contents

|   |    |
|---|----|
| ABSTRACT .....  | v  |
| LIST OF FIGURES .....                                 | ix |
| LIST OF TABLES.....                                   | x  |
| LIST OF ABBREVIATIONS .....                           | xi |
| CHAPTER 1.....  | 1  |
| INTRODUCTION.....                                     | 1  |
| 1.1 Background of the Study .....                     | 1  |
| 1.2 Global scenario Of Cesarean Section Rate .....    | 2  |
| 1.3 Status of Cesarean Section Rate in Pakistan.....  | 5  |
| 1.4 Significance of the Study.....                    | 8  |
| 1.5 Objectives of the Research.....                   | 9  |
| 1.6 Organization of the Study .....                   | 9  |
| CHAPTER 2.....  | 10 |
| LITERATURE REVIEW.....                                | 10 |
| 2.1 Introduction.....                                 | 10 |
| 2.2 Literature Review.....                            | 10 |
| 2.3 Research Gap .....                                | 19 |
| CHAPTER 3.....  | 21 |
| DATA AND METHODOLOGY.....                             | 21 |
| 3.1 Introduction.....                                 | 21 |
| 3.2 Data and Variables .....                          | 21 |
| 3.2.1 Source of data.....                             | 21 |
| 3.2.2 Study Tool.....                                 | 22 |
| 3.2.3 Study Design and Participants.....              | 22 |
| 3.2.4 Ethical Consideration and Data Collection ..... | 23 |
| 3.3 Methodology .....                                 | 23 |
| 3.3.1 Unit of Analysis.....                           | 23 |
| 3.3.2 Research Strategy .....                         | 23 |
| 3.3.3 Statistical Analysis .....                      | 24 |
| 3.3.4 Dependent and Independent Variables .....       | 26 |
| CHAPTER 4.....  | 29 |
| RESULTS AND INTERPRETATION.....                       | 29 |

|         |   |    |
|---------|---|----|
| 4.1     | Introduction.....   | 29 |
| 4.2     | Descriptive Statistics .....  | 29 |
| 4.3     | Questionnaire and its Data Characteristics .....  | 34 |
| 4.3.1   | Characteristics of data for public and private hospitals .....  | 34 |
| 4.4     | Objective 1: Analysis of Natural delivery rates and CS rates in tertiary hospitals in Islamabad .....   | 49 |
| 4.4.1   | Distribution of natural delivery and CS rates in public hospital .....  | 49 |
| 4.4.1.1 | Frequency of indications for elective CS.....   | 51 |
| 4.4.1.2 | Frequency of indications for emergency CS.....  | 52 |
| 4.4.1.3 | Frequency of indications for CS on demand.....  | 53 |
| 4.4.2   | Distribution of natural delivery and CS rates in private hospital (a) .....   | 54 |
| 4.4.2.1 | Frequency of indications for elective CS.....   | 55 |
| 4.4.2.2 | Frequency of indications for emergency CS.....  | 57 |
| 4.4.2.3 | Frequency of indications for CS on demand.....  | 58 |
| 4.4.3   | Distribution of natural delivery and CS rates in private hospital (b) .....   | 59 |
| 4.4.3.1 | Frequency of indications for elective CS.....   | 60 |
| 4.4.3.2 | Frequency of indications for emergency CS.....  | 61 |
| 4.4.3.3 | Frequency of indications for CS on demand.....  | 62 |
| 4.5     | Objective 2: Determination of cost difference between natural delivery and C-section .....  | 63 |
| 4.6     | Objective 3: Determination of overall relative influencing factors of the cost in both the natural delivery and C-section for both public & private hospitals. .... | 66 |
| 4.6.1   | Determination of influencing factors of the cost of public hospital and private hospitals ...   | 67 |
|         | CHAPTER 5.....  | 69 |
|         | DISCUSSION.....   | 69 |
|         | CHAPTER 6.....  | 79 |
|         | CONCLUSION AND POLICY RECOMMENDATION .....  | 79 |
| 6.1     | INTRODUCTION.....   | 79 |
| 6.2     | CONCLUSION .....  | 79 |
| 6.3     | POLICY RECOMMENDATIONS.....   | 80 |
| 6.4     | LIMITATIONS OF THE STUDY .....  | 82 |
|         | REFERENCES.....   | 84 |
|         | ANNEXURE I: QUESTIONNAIRE .....   | 88 |
|         | QUESTIONNAIRE .....   | 88 |
|         | ANNEXURE II: Graphical Representations .....  | 93 |



|                                 |     |
|---------------------------------|-----|
| ANNEXURE III: CONSENT FORM..... | 107 |
| Consent Form .....              | 107 |

## LIST OF FIGURES

|  |    |
|--|----|
| Fig 1.1 Summary of data from PDHS related to trends in place of birth, wealth<br>Quintile, education and region..... | 6  |
| Fig 1.2 Summary of data from PDHS highlighting trends in C-section delivery.....                                     | 7  |
| Fig 4.1 Response characteristics of Indications of elective CS.....  | 51 |
| Fig 4.2 Response characteristics of Indications of emergency CS.....   | 52 |
| Fig 4.3 Response characteristics of Indications of CS on demand.....   | 53 |
| Fig 4.4 Response characteristics of Indications of elective CS.....  | 55 |
| Fig 4.5 Response characteristics of Indications of emergency CS.....   | 57 |
| Fig 4.6 Response characteristics of Indications of CS on demand.....   | 58 |
| Fig 4.7 Response characteristics of Indications of elective CS.....  | 60 |
| Fig 4.8 Response characteristics of Indications of emergency CS.....   | 61 |
| Fig 4.9 Response characteristics of Indications of CS on demand.....   | 62 |
| Fig 5.1 Frequency of Natural delivery & CS in public hospital .....  | 67 |
| Fig 5.2 Frequency of Natural delivery & CS in private hospital (a).....  | 68 |
| Fig 5.3 Frequency of Natural delivery & CS in private hospital (b).....  | 69 |

## LIST OF TABLES

|            |  |    |
|------------|--|----|
| Table 1    | Data of C-section rates in 150 countries categorized according to UN Grouping in 2014..... | 4  |
| Table 4.1  | Descriptive statistics of public hospital data variables.....                              | 29 |
| Table 4.2  | Descriptive statistics of private hospital data (a) variables.....                         | 30 |
| Table 4.3  | Descriptive statistics of private hospital data (b) variables.....                         | 31 |
| Table 4.4  | Response Characteristics of data obtained from the questionnaire by the patients.....      | 42 |
| Table 4.5  | Distribution of different modes of delivery for public hospital.....                       | 50 |
| Table 4.6  | Frequency of indications for elective CS.....  | 51 |
| Table 4.7  | Frequency of indications for emergency CS.....   | 52 |
| Table 4.8  | Frequency of indications for CS on demand.....   | 53 |
| Table 4.9  | Distribution of different modes of delivery for private hospital (a).....                  | 54 |
| Table 4.10 | Frequency of indications for elective CS.....  | 55 |
| Table 4.11 | Frequency of indications for emergency CS.....   | 56 |
| Table 4.12 | Frequency of indications for CS on demand.....   | 57 |
| Table 4.13 | Distribution of different modes of delivery for private hospital (b).....                  | 59 |
| Table 4.14 | Frequency of indications for elective CS.....  | 60 |
| Table 4.15 | Frequency of indications for emergency CS.....   | 61 |
| Table 4.16 | Frequency of indications for CS on demand.....   | 62 |
| Table 4.17 | Comparison of delivery cost among different modes of delivery.....                         | 65 |
| Table 4.18 | Impact factors of total cost (private hospitals & Public Hospital) .....                   | 67 |

## LIST OF ABBREVIATIONS

|      |   |
|------|---|
| CS   | Cesarean Section  |
| WHO  | World Health Organization                                     |
| PDHS | Pakistan Demographic and Health Survey                        |
| EBP  | Episode-Based Bundle Payment Policy                           |
| NCMS | New Cooperative Medical Scheme                                |
| DID  | Difference in Difference                                      |
| NPR  | Norwegian Patient Registry                                    |
| MBRN | Medical Birth Registry of Norway                              |
| MCDM | Multi Criteria Decision Making Technique                      |
| BDHS | Bangladesh Demographic and Health Survey                      |
| HDDS | Health and Demographic Surveillance System                    |
| BP   | Blood Pressure  |
| HB   | Hemoglobin  |
| OECD | Organization for Economic Corporation and Developed Countries |

# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the Study

Cesarean section (CS or C-section) defined to be a surgical procedure done to deliver a baby via incisions in the abdomen and uterus, is an intervention carried out for the assurance of mother and infant safety when vaginal delivery is not possible (emergency CS) or in case where the dangers to the mother and baby outweigh the safety with a vaginal delivery (planned CS) (U. WHO & Unicef, 2009). The CS is among the most common surgeries with the rates rising continuously in high- and middle-income countries. Although the CS has safe implications, but the procedure is sometimes performed without any need, putting the mother and the child at short- and long-term health risks/complications. Therefore, the WHO recommended that CS must be considered only when the need arise as per the case and has discouraged the practice for target rates (WHO, 2015). In order to monitor the maternal health progress, population-based C-section rate has been considered a process indicator (Organization, 1994). The international healthcare community since 1985 has considered the ideal rate for CS to be between 10-15%. Wherein, if the CS rates rise towards 10% in the population, there is decrease in the proportion of maternal and newborn deaths, whereby, if the rate goes beyond 10%, no improvement can be seen in the maternal or neonatal mortality (WHO, 2015). The past decade has seen a remarkable growth in the population-based C-section rates universally, with the current average rate of 27% C-section have been recorded

during the year 2013 from both developed and developing countries (Publishing, Cooperation, & Staff, 2013),(Festin et al., 2009). Therefore, the WHO has recommended that CS must be practiced only in those cases where it is considered necessary such as ; where vaginal delivery poses a threat to the health of both mother and baby i.e., due to prolonged labor period, fetal distress, or abnormal positioning of the baby. However, the procedure can also cause significant complications itself which includes disability or death, especially in settings which lack proper facilities (WHO, 2015). Besides posing adverse impact upon maternal, neonatal and infant morbidity and mortality, high cost of C-section may result in appalling health expenditure for families and apply extra pressure on the overburdened health systems particularly in low- and middle-income countries (Organization, 1994),(Festin et al., 2009). The non-medical indications result about one-third of total 18.5 million C-sections that are performed annually which adds heavily to the global total excess of C-section. This alarming situation of C-section rates calls for monitoring indications and other underlying reasons of all C-sections in public and private sector (Ana P Betrán et al., 2007).

## **1.2 Global scenario Of Cesarean Section Rate**

In world health report (2010) which studied the global numbers and total cost estimation of needed and excess CS performed per year, CS rates from 137 countries were obtained that represents 95% of global births in the year 2008. The results obtained showed that the countries with CS rates below 10% reflected underuse and the countries with CS rates above 15% were reflected to show overuse of the C-section procedure. Of the 137 countries, 54 countries showed CS rates below 10%, 69

countries showed CS rates above 15% and 14 countries showed CS rates between 10-15%. It has been predicted that in 2008 an additional 3.18 million CS were needed while 6.20 million unnecessary CS were performed. The cost of the global excess CS was estimated to be US\$ 2.32 billion approximately, while the cost of the global needed CS was US\$432 million approximately (Gibbons et al., 2010).

Around the globe, 126 countries showed that on average 15% of births were delivered via CS, with variations among regions and countries (Ana P Betrán et al., 2007). A worldwide increase in the CS rates can be seen according to previous literature, referring that CS rates vary among different countries such as: from 1980 to 2010, in Sweden and Netherlands the CS rate was less than 20%, whereas the CS rate in England was between 20% - 30%. In the United States, the CS rate was more than 30%, which is parallel to that in China and Brazil. In the meantime, there was an increase in the trends of CS rates in different countries every year (Villar et al., 2006). In case of China, the CS rates in the urban cities increased drastically to 39.5% from 1998-2002 (Tang, Li, & Wu, 2006). According to an official report by the WHO, the China ranked first in Asia and second in the world with the CS rates of 46.2% during 2007-2008 (Lumbiganon et al., 2010). Data on globally increasing trends of CS rates in 150 countries estimated from 1990-2014 is summarized in table 1 (Ana Pilar Betrán et al., 2016).

**Table 1:** Data of C-section Rates in 150 countries categorized according to United Nations Grouping in 2014 (Ana Pilar Betrán et al., 2016)

| <b>Region/ Subregion</b>               | <b>Births by cesarean section (%)</b> |
|--|---------------------------------------|
| <b>Africa</b>                          | 7.3                                   |
| Eastern Africa                         | 3.9                                   |
| Middle Africa                          | 5.8                                   |
| Northern Africa                        | 27.8                                  |
| Southern Africa                        | -                                     |
| Western Africa                         | 3.0                                   |
| <b>Asia</b>                            | 19.2                                  |
| Eastern Asia                           | 34.8                                  |
| South-central Asia                     | 11.4                                  |
| South-eastern Asia                     | 14.8                                  |
| Western Asia                           | 26.8                                  |
| <b>Europe</b>                          | 25.0                                  |
| Eastern Europe                         | 23.7                                  |
| Northern Europe                        | 22.4                                  |
| Southern Europe                        | 30.7                                  |
| Western Europe                         | 24.5                                  |
| <b>Latin America and the Caribbean</b> | 40.5                                  |
| Caribbean                              | 27.5                                  |
| Central America                        | 38.2                                  |
| Southern America                       | 42.9                                  |
| <b>Northern America</b>                | 32.3                                  |
| <b>Oceania</b>                         | 31.1                                  |
| Australia/New Zealand                  | 32.3                                  |
| <b>World total</b>                     | 18.6                                  |
| Least developed regions                | 6.0                                   |
| Less developed regions                 | 20.9                                  |
| More developed regions                 | 27.2                                  |

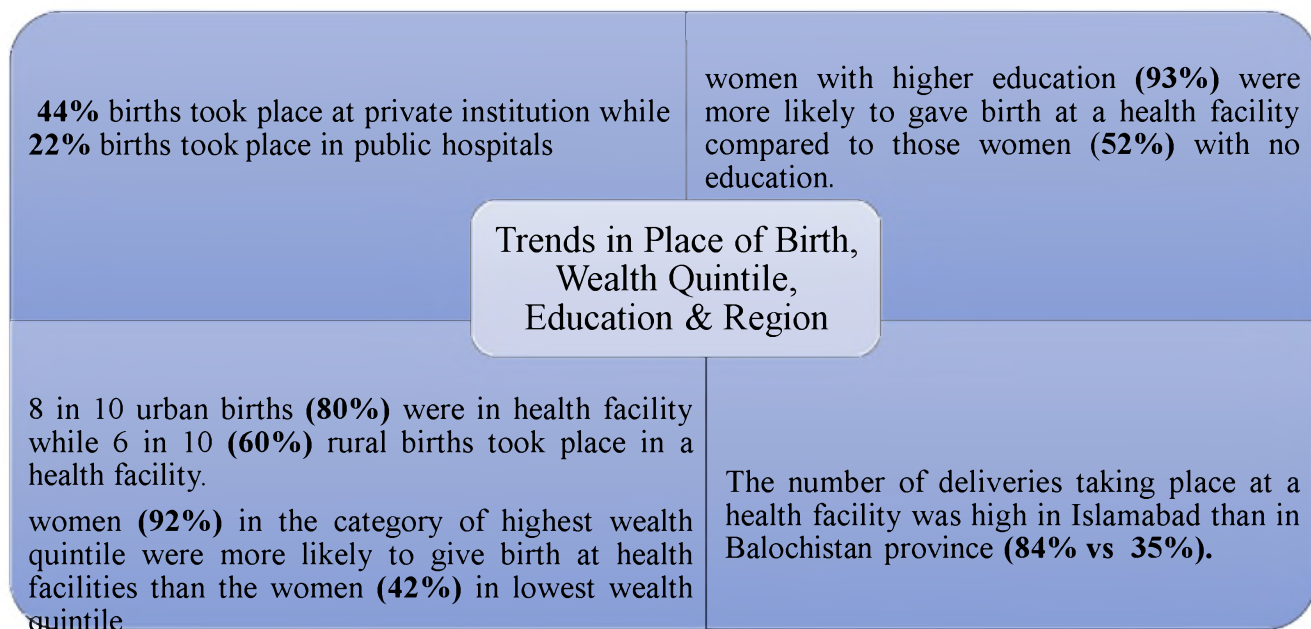


### **1.3 Status of Cesarean Section Rate in Pakistan**

According to the WHO, in 2015 there were 9,700 women who died of maternal complications in Pakistan. Similarly other Studies indicated significant increase in cesarean section rates from 2.70% in 1990–1991 to 15.80% in 2012–2013, and alone the rate of C-section in the urban regions of Pakistan were 35.90% and 36.40% in public and private hospitals during the same time period (Souza et al., 2016),(Organization, 2015),(Mumtaz, Bahk, & Khang, 2017).One of the reasons of normalization of the procedure is because of the acknowledgement of its role in saving maternal and neonatal lives especially in developing countries like Pakistan where the status of maternal and neonatal health is far from satisfactory. 52% of Pakistani women deliver at home, mostly with the assistance of traditional birth attendants. However, there is an increase in the rates of C-section deliveries particularly in urban areas of Pakistan. Pakistan Demographic and Health Surveys have reported a percentage of 13 % and 24 % of C-section rates in urban areas for the years 2006-2007 and 2012-2013 respectively (Studies, Demographic, & Surveys, 2012). The rate has progressed to the extent that one in five babies that comes into the world is by the cesarean section (C-Section) in Pakistan. It has been evident from the most recent report of Pakistan Demographic and Health Survey (PDHS) that the rates of C-Section deliveries have rapidly increased from 14% in 2012-13 to 22% in 2017-18 (Demographic).

In Pakistan, where home deliveries are more preferred, trends have now been shifted towards institutional delivery which is considered to be an important factor in order to reduce the health risks to both mother and the child. The PDHS survey data showed

that institutional deliveries have been increased from 13% to 66% between 1990-1991 to 2017-2018. Of which 44% deliveries took place in private facilities and 22% took place in government hospitals. Important highlights of the data from PDHS related to the place of birth, wealth status, education and region has been summarized in Fig 1.1 (Demographic).



**Figure 1.1:** Summary of data from PDHS related to trends in place of birth, wealth quintile, education and region.

Likewise, it was evident from the PDHS survey that the prevalence of C-section has been increased during the past years from 14% in 2012-2013 to 22% in 2017-2018. The data related to the trends in C-section has been summarized in Fig 1.2 (Demographic).

| Trends in C-Section Delivery  |  |  |
|---|--|--|
| <p>The C-section delivery was high (<b>38%</b>) in private facilities than the public health facilities (<b>25%</b>).</p> <p>The prevalence rate of C-section delivery was twice in urban areas (<b>32%</b>) than rural areas (<b>18%</b>).</p> | <p><b>49%</b> of women with high education opted for C-section compared to <b>11%</b> of women with no education and opting of C-section.</p> <p>Women with highest wealth quintile (<b>46%</b>) were more likely to deliver by C-section compared to women with lowest wealth quintile (<b>8%</b>).</p> | <p>The %age of C-section deliveries accounts for <b>29%</b> of births both in Islamabad and Punjab while only <b>11%</b> in FATA region.</p> |

*Figure 1.2:* Summary of data from PDHS highlighting trends in C-section delivery.

As stated earlier, an upward trend in the CS is because of its association with the better outcomes. However, the procedure poses long and short-term complications which are under investigation. A review of 79 studies comparing the outcomes of elective cesarean sections and the natural deliveries by (Jose et al, 2007), proposed that CS may possess greater risk compared to vaginal deliveries (Belizán, Althabe, & Cafferata, 2007). CS procedures are often associated with increased risk of maternal mortality, hysterectomy, ureteral tract and vesical injury, abdominal pain, neonatal respiratory morbidity, fetal death, placenta previa and uterine rupture in future pregnancies (Belizán, Cafferata, Althabe, 2006). Elevated CS rates negatively affect the health care system in terms of resource use compared to the natural delivery which in turn impart deteriorating impact on the health care systems of under developed or

economically poor countries (Khawaja, Kabakian-Khasholian, & Jurdi, 2004). It has also been concluded from previous researches that high frequency of CS deliveries has been seen in private health sector. The reasons for this high rate were concluded to be monetary advantages or self decision of the patient (Potter et al., 2001),(Neuman et al., 2014),(Yassin & Saida, 2012). While past studies reveal that Pakistan exceeds the recommended percent of deliveries via cesarean section to date. Several factors have been recognized that showed association with increased CS rates at hospitals such as education, employment status, high age and high socio economic status (Idris et al., 2006),(Agha & Carton, 2011),(Tey & Lai, 2013). As CS are more expensive compared to Vaginal delivery, WHO stated that due to their increased cost, high rates of CS results in pulling away the resources from other services and therefore weakens the health systems (WHO, 2015).

#### **1.4 Significance of the Study**

In this study, the overall situation of maternity procedures conducted in Pakistan, availability and their condition in hospitals, the cost difference between C-section and natural delivery and the contributing/influencing factors that lead to Cost difference would be highlighted. One of the important aspects of the study is that it will define a direction for the development and design of maternal health policy related to CS because in Pakistan, no hospital, be it public or private, has an explicit C-Section policy.

## **1.5 Objectives of the Research**

The objectives of the study are:

- To analyze the Cesarean section (CS) rates and natural delivery rates in tertiary hospitals in Islamabad.
- To determine the costs associated with CS and natural deliveries.
- To determine the overall relative influencing factors of the costs in both the C-section and natural deliveries.

## **1.6 Organization of the Study**

The current study has been sectioned into 6 chapters with the following organization. Chapter 1 is the introduction of the study in which the background of the study, national and international scenario of the study topic and its significance has been discussed followed by the main objectives which need to be find out and upon which the thesis is based. Chapter 2 embodies extensive literature review, in which a detailed literature search has been included in support of the topic in hand. Chapter 3 consists of data and methodology and this chapter discusses in detail the methodology adopted for the data collection and statistical analysis tools used for interpretation of the data. Chapter 4 discusses the results and interpretation in which the results are represented in tables and are construed accordingly. Chapter 5 of the thesis consists of the discussion of the results obtained in chapter 4. Chapter 6 is the final chapter which includes conclusion of the main findings of the research study along with policy recommendations and suggestions for future research course. Chapter 6 is followed by the references.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

Literature assessment has established that the likelihood of C-section depends on institutional, demographic and socioeconomic factors. The probability of C-section is associated with multiple conception, maternal age, rise in institutional deliveries, place of birth i.e., public or private sector, availability of facilities, obstetrician, education and access to antenatal care.

#### 2.2 Literature Review

**Safa I (2022)** directed research to evaluate the determinants of C-section in both public and private sector hospitals. In this study, a sample of 1090 women undergone C-section delivery were estimated using Logistic Regression Model from the National Household Survey of Budget, Consumption and Living Standard 2015. The Regression model results showed that C-section occurrence is higher in private hospitals. Furthermore, it has also been stated that the factors associated with C-section delivery in Private hospitals include advanced maternal age and number of antenatal visits. Whereas in public hospitals the main factors contributing to C-section includes maternal age above 35 years, with chronic disease and living in urban areas (Ismail, 2022).

**Abdallah W et al. (2021)** conducted a study to evaluate the C-section rate in a tertiary hospital in Beirut, Lebanon, using Robson Classification for the first time. The data was

taken from the hospital record for the years 2018-2020. It was concluded that the C-section rate came out to be 56.8% among Robson groups 5, 2 and 10 which required be minimized by implementing strict departmental policies (Abdallah et al., 2022).

**Rasool M F et al. (2021)** carried a cross sectional study between September 2019- march 2020 to assess the frequency and risk factors associated with C-section as well as the assessment of knowledge among the women who have undergone C-section delivery, in Southern Punjab. The data collection was done using Questionnaire. Out of total 173 women who underwent C-section, 104 cases were elective/planned while 69 cases were emergency C-section. The high C-section rates were associated with younger age, pregnancy complications such as hypertension, gestational diabetes, eclampsia/preeclampsia vaginal bleeding and mothers that belong to urban areas (Rasool et al., 2021).

**Amjad et al. (2020)** conducted a study in which the research group analyzed the secondary data from PDHS (1990-2018). The sample size of the study was 4029, 5721, 7461 and 8287 for the time periods of 1990-91, 2006-07, 2012-13 and 2017-18 respectively. The study results showed high prevalence of C-section among mothers over the age of 24 years, mostly residing in Punjab, opted private institutions, belonged to high socioeconomic status and urban areas. According to the research, it was concluded that an upsurge has been seen in the C-section deliveries with the %age of mothers delivering by C-section increased from 3.2% in 1990-91 to 19.6% in 2017-18 (Amjad et al., 2020).

**Kanji Z et al. (2019)** conducted a research study on examining the clinical indications for C-section in a university hospital in Karachi, Pakistan. In this study the researchers did retrospective analysis of patient medical record from January 1<sup>st</sup>, 2018-March 31<sup>st</sup>,

2019 with total number of deliveries n=1211. The study revealed that 49.7% patients underwent C-section (602/1211). The most common reasons associated with higher rate of C-section came out to be repeat CS (44.20%), failure to progress (12.90%), abnormal position of baby (9.3%), fetal distress (8.20%) and fetal growth complications (4.7%) (Kanji et al., 2019).

**Meng et al. (2019)** conducted a study to determine the effects of EBP (Episode-based bundle payment policy) on rate of C-section delivery, cost of childbirth and readmission of rural patient to NCMS agency (New Cooperative Medical Scheme) by means of a natural experiment method and DID (difference in difference) method. The results of the study showed that EBP policy had achieved a short-term success in reducing the rate of C-section delivery (33.97% decrease in the probability of caesarean delivery), the policy also lessened the total spending per admission, government reimbursement expenses per admission and out of pocket payment per admission, whereas no evidence of increase in readmission rates has been seen (Meng et al., 2019).

**Abbas et al. (2018)** conducted a study on prevalence and determinants of cesarean delivery in Punjab, Pakistan showed that higher maternal age women, multiple antenatal care visits, and higher wealth quintiles were associated with higher rate of C-section. Also, the women in Punjab were more likely to deliver in Private sector with no exception in urban and rural areas (F. Abbas, Amir ud Din, & Sadiq, 2018).

**Norum J & Svee ET (2018)** conducted a model-based analysis on data taken from Norwegian Patient Registry (NPR) and Medical Birth Registry of Norway (MBRN). This study covered the C-section and Vaginal birth rates of each hospital trust in Northern Norway. The study results revealed that the CS rates were 17.5% and the finance of total



deliveries (4860 deliveries)) was €16,351,335(CS Births: €6,389,323 and Vaginal Births: € 9,962,012). The CS rates varied significantly with low probability ( $p < 0.002$ ) in Southern region. It was concluded from the results that although the economic consequences of the model based financial incentive were not significant but was sufficient to influence the CS rates (Norum & Svee, 2018).

In a study conducted by **Amjad A et al. (2018)** using secondary data taken from Pakistan Demographic and Health Survey (2012-2013), it was found out that the percentage of women delivering via C-section came out to be 13.6%. Also, the factors that majorly contributed to C-section delivery included maternal age more than 24 years, women with high education and professionally stable, women residing in Punjab Province, pregnancy complications, increased number of antenatal visits and preference of private facility. The results of the study concluded that strict measures must be implicated to deal with the increase %age of C-section deliveries in Pakistan (Amjad et al., 2018).

Likewise, a research group **Ali Y et al. (2018)** conducted a study to identify the factors that contributed towards increase in the C-section rate in Pakistan by using MCDM (Multi Criteria Decision-Making Technique. The data collected were analyzed using MCDM technique called Decision Making Trial and Evaluation Laboratory. The study concluded that medical factors like umbilical cord prolapse, age and obesity contribute towards rising rate of C-Section. On the other hand, non-medical factors responsible such an increase in C-section deliveries are increased number of private hospitals, unethical acts of doctors in the hospitals, preference of patients and poor conditions of hospitals in rural areas (Ali et al., 2018).

One of the unique concepts used by the research group **Abbas A et al. (2018)** was to analyze the C-section data by Machine learning methods. The aim of this study was to cause analyze the factors associated with the rise in the C-section cases and helping the physicians in decision making via provision of decision support systems based on knowledge taken from machine learning approaches. The study indicated that this study will help in analyzing the data collected regionally through various classification models which in turn would help the physicians to understand the data patterns and decision making (S. A. Abbas, Riaz, Kazmi, Rizvi, & Kwon, 2018).

In another research by **Haider MR et al. (2018)** is conducted to study the economic burden of increasing C-Section rates in Bangladesh. The study was carried out by analyzing the birth data taken from BDHS (Bangladesh Demographic and Health Survey) for the years of 2000-2014. The results showed that over the years 2000-2014 the institutional deliveries had increased 4 folds while C-section deliveries had increased 8 folds. The C-section rate has been increased from 33% in 2000 to 63% in 2014. Health care expenditure associated to C-section accounts for 66.5% of the total expenditure on all deliveries in Bangladesh in 2010 (M. R. Haider et al., 2018).

**Parveen Z et al. (2017)** conducted a study to determine the socioeconomic factors between home-based and institutional delivery in Pakistan using data from PDHS (1990-91, 2006-07, 2012-13). The study results showed 4 times increase in home-based delivery in 1990-91 when compared to institutional delivery 5465 (85.3%) vs 851 (13.3%). The statistics changed to 2 times higher that is 900 (64.7%) vs 3128 (34.3%) in the time period 2006-07. Whereas for the time period 2012-13, the number of women delivered at home and health facility were nearly same i.e., 6180 (51.6%) vs 5773 (48.2%). The

results obtained from the study concluded that there were large gaps between the rates of institutional delivery among various population groups and this is accompanied by socioeconomic, financial differences and education status (Parveen, Sadiq, Abbas, & Amir-ud-Din, 2017).

**Mumtaz et al. (2017)** studied the rising trends and inequalities in C-section rates in Pakistan and find out an overall increasing trend and unequal coverage of C-section in Pakistan. The C-section rates were high among women with higher socioeconomic status, higher education and urban population. While the rate was lower among women with less education, poorest socioeconomic stratum and rural areas (Mumtaz et al., 2017).

A retrospective study by **Begum T et al. (2017)** was conducted to determine the indications and determinants of C-section in MATLAB, Bangladesh. The data from HDDS (Health and Demographic Surveillance System) were analyzed for the year 2013. It was concluded that during 2013, institutional delivery rate was 84% and population-based C-section rate was 35% of the total deliveries. From the total C-sections, 1.4% was carried out for absolute maternal indications. Those indications included: repeat C-section (24%), fetal distress (21%), prolonged labor (16%), oligohydramnios (14%) and post maturity (13%). 80% of the C-sections were performed in for-profit private hospitals. The results also revealed that Probability of C-section increased with high socioeconomic status, higher education, higher age, lower birth order and high number antenatal care visits (Begum et al., 2017).

A 2016 study by **Souza JP et al. (2016)** indicated that substantial increase in C-sections rates were not because of medical indications rather C-section were performed as

unnecessary surgical procedures such as non-evidence-based indications, professional convenience and elective C-section (Souza et al., 2016).

**Acharya J et al. (2016)** conducted a hospital based cross sectional study which included 384 post-partum mothers in two tertiary hospitals in Nepal. The aim of this study was to determine the hidden costs associated with hospital-based deliveries. The results showed the total hidden costs for normal and C-section delivery were 243.4 USD and 321.6 USD respectively. Out of all the maternity care expenditures, higher mean expenditures were found for food & drinking with a % age of 53.07% followed by clothes 9.8% and transport 7.3%. The total mean opportunity cost in terms of “days of work loss” for post-partum women with their husbands was 84.1 USD for normal delivery and 81.9 USD for C-section. Other factors such as literate mothers, working house head, monthly income more than 25000 NR, delivery in private hospitals, longer duration of stay in the hospital, long travel distance and longer travel time showed prominent association with higher hidden costs (Acharya et al., 2016).

**Jisun FT & Kabir R (2014)** directed a comparative study regarding the preference of delivery process in Bangladesh. The study covered the scenario of C-section vs vaginal delivery in Bangladesh along with the factors that influence the decision of the women about their delivery process. The results showed that the variables such as place of living, age, level of education, socioeconomic status, occupation and choice of institution plays a significant role in deciding the process of delivery (Jisun & Kabir, 2014).

**Hopkins K et al. (2014)** analyzed the data for the years 1998, 2003 and 2008 taken from PNAD (a nationally representative household survey). The results obtained showed that Brazilian C-sections rates were 42% in 1998 while in 53% in 2008. Furthermore, it was

revealed that women who were publicly funded had low C-section rates compared to those women who were privately financed. Also, the determinants like older age, higher education, payment source, hospital type positively affects the choice of C-section (Hopkins, de Lima Amaral, & Mourão, 2014).

Similarly, another study conducted by **Jabeen J et al. (2013)** in which the researchers analyzed the indications and frequency of C-section in Obstetrics and Gynecology department of CMH, Rawalpindi. The study was a cross sectional study which included the pregnant women during the period from Nov, 2011-Oct, 2012. Total number of deliveries done during the selected time period were 3049, out of which 1709 (56%) were C-section and the common reasons for this high frequency of C-section were repeated C-section (40.3%), followed by failed induction (13.5%) and fetal distress (11.2%) (Jabeen, 2013).

**Grytten J et al. (2011)** conducted research on impact of hospital revenue on increasing rate of Caesarean section in Norway using data from Medical Birth Registry from. The results concluded that 1976-2005. The study results showed that C-section rate with respect to hospital revenue per bed was 0.13 which makes 35% increase in C-section rate from base year 1976 to the final year 2005 (Grytten et al., 2011).

Majority of the studies on CS and vaginal delivery done in Pakistan has targeted the clinical indications and its frequency, however little consideration has been given to its costing and economic burden. One study conducted by **Atia Khan and Shakila Zaman (2010)** focused on costs of vaginal delivery and C-section at a tertiary level public hospital in Islamabad, Pakistan. The researchers carried out a cross sectional study to find out the average cost of vaginal delivery and C-section from two perspectives: the hospital

and the patient. The results obtained showed that average cost of spontaneous vaginal delivery was 40 US \$ (2688 rupees) from hospital side and 79 US \$ (5278 rupees) from patient's perspective. The average cost for a C-section from hospital perspective was 162 US \$ (10868 rupees) and 204 US \$ (13678 rupees) from patient's side (Khan & Zaman, 2010).

Another study conducted by **Haider G et al. (2009)** aimed at determining the frequency and indications of C-section in a tertiary care hospital. The study was conducted over a period of one year and the sample size taken was 380 patients. The results showed that majority of the patients at the hospital underwent emergency C-section (225 out of 380) and the common reason for C-section came out to be repeated cesarean delivery (with higher percentage of 19.2% of patients) (G. Haider, Zehra, Munir, & Haider, 2009).

Due to the importance of cost analysis associated with the maternity services, various studies were done in developing countries. One such study was conducted by **Borghi J et al. (2003)** to determine the costs of publicly provided maternity services in Rosario, Argentina. In this study cost of antenatal visit was assessed in two health centers and the patient's costs on such visit were assessed in a hospital and a health center. The results obtained demonstrated a per day hospital cost was \$114.62 and an average cost of C-section was \$525.57 which was five times greater than that of vaginal delivery (\$105.61). This result showed that normal vaginal delivery costs less at the general hospital while C-section costs less at a maternity hospital. Likewise, the average cost of antenatal visit was \$31.10. The provider cost came out to be lower at a health center compared to the hospital. Direct costs were found out to be lower than the indirect costs of waiting time and travelling. With these results, the study suggested that resources can be efficiently

utilized by promoting antenatal visits at primary level thus benefiting with reduced wait time and travel and also the provider will be benefited by encouraging normal deliveries at a general hospital and C-section at a maternity hospital (Borghini et al., 2003).

Likewise, a paper by **Green A et al. (2001)** reported two studies based in the Baluchistan province of Pakistan. The studies discussed the cost analysis of primary care facilities, district and divisional hospitals of the province for the very first time. From the results of the studies it was revealed that there was a high level of underfunding in primary care of the health sector, similar to the case with medicines. Therefore, the results obtained demonstrated mainly on the rational allocation of resources within the primary health care and development of a decentralized health system (Green, Ali, Naeem, & Vassall, 2001).

### **2.3 Research Gap**

In general, the fact is known that C-section is more expensive than vaginal deliveries. Most of the studies performed in Pakistan focused mainly on the incidence rates, clinical indications, and regional comparisons among the mode of delivery, however none has highlighted the aspect of cost.

As there is less information known and almost no study addressing about the cost or economic burden associated with C-section so far in Pakistan has been conducted. That is why the current study has been implied with the purpose to cover different aspects of the two different modes of deliveries. This study focused on determining the rates of C-section and natural delivery and most importantly would provide an insight about the cost associated to the different mode of deliveries i.e. C-section and natural delivery. Also, the difference among the cost of same mode of delivery and the two different modes of deliveries can also be apparent which in turn will help to analyze the various underlying determinants resulting in the cost difference.

Thus, the current study is different from other studies by the fact that this research would cover 3 objectives at the same time with the main objective of finding out the Cost and economic burden associated with the delivery procedures, cost difference between C-section and natural delivery and the factors associated with the cost difference. Thus providing us a vision to identify the loopholes in the health care system and direct ways to invent a fruitful health care policy addressing this particular issue so as to halt the uncontrollable increasing rates of C- section.



## **CHAPTER 3**

### **DATA AND METHODOLOGY**

#### **3.1 Introduction**

Chapter 3 covers in detail about the data and methodology utilized in the execution of thesis work. First of all, this chapter will discuss all the variables that have been used in the research followed by the methodology adopted for the data collection and its further analysis. As evident from the objectives of the study (as mentioned earlier in Chapter 1) the methodology analysis will consist of three steps. In step 1, the frequency/incidence rates along with other variables of C-section and natural delivery will be analyzed among public and private hospitals that have been selected for the research study. In step 2, cost analysis will be done for both the C-section and natural delivery. In step 3, the variables that contribute towards the cost difference for C-section and natural delivery procedures would be analyzed.

#### **3.2 Data and Variables**

This study includes different data and variables steps as discussed below:

##### **3.2.1 Source of data**

For the current study purpose, the primary data was used. The data was collected from one public and two private hospitals in Islamabad.

### **3.2.2 Study Tool**

Data collection for the current study was done by using a self-designed study Questionnaire. The questionnaire consists of three domains. The first part comprised of questions related to sociodemographic factors such as age, residence, level of education, employment status, socio economic level, average monthly income, parity (no. of live births) and preference of facility for giving birth. The second part consists of questions regarding obstetrics variables i.e., mode of delivery (previous and current), indications for CS (either elective CS, emergency CS and CS on demand), pregnancy related complications, gap between previous and current pregnancy and length of hospital stay. The last part of the questionnaire consists of information regarding the total cost on childbirth. The sample Questionnaire can be seen in annexure 1.

### **3.2.3 Study Design and Participants**

An observational cross-sectional study was conducted with the help of a self-designed Questionnaire as discussed above, from November 2021-February 2022. The study was performed at one public hospital and two private hospitals in Islamabad. Hospitals selection was done on the basis of approval, only the hospitals that have given permission to collect the data were selected for the study. The study population consists only of women who have given birth at the Obstetrics and gynecology department of these selected public and private hospitals. A total of 106 cases were included in the study with a complete term and has given birth either through natural delivery or CS (Elective, Emergency or CS on demand), apart from these other gynecological related cases were excluded and not considered fit for the study.

### **3.2.4 Ethical Consideration and Data Collection**

The current study and the questionnaire were approved by the respective ethical committee of the selected public and private hospitals and after given the approval, the data from the related hospitals were collected. The data was collected via face-to-face interviews. Furthermore, informed consent was taken from every individual before participation in the study. Fictitious numbers were assigned to each study questionnaire.

## **3.3 Methodology**

This study includes methodology steps discussed below:

### **3.3.1 Unit of Analysis**

Unit of analysis in this study is the cost of two modes of deliveries (C-section and natural delivery) and the determinants/factors contributing to the cost of the cesarean section and natural delivery.

### **3.3.2 Research Strategy**

The research strategy for the current study has been divided into three steps. In first step the focus would be on determining the incidence rates/distribution of C-section and natural deliveries among the public and private hospitals.

The second step involved the analysis of the cost of C-section and natural delivery in. So that it would be made clear as how much the cost varies among the two procedures.

And in the final step, the influencing factors that contribute to the cost difference among C-section and natural delivery would be determined. This would help in providing an

insight to the possible interventions that can be made to implement uniformity among the hospitals to control major cost changes and lower the burden on individuals to a certain level if not more.

The data obtained is analyzed using Stata and results are then compiled in the form of charts and tables.

### 3.3.3 Statistical Analysis

The statistical tool Stata was used for the statistical analysis. All the data was entered to Stata software and following statistical test was adopted for the compilation of data.

- **Chi-square Test:** To compare the distribution/ incidence rates and other related characteristics of normal delivery and CS.

A Chi-square test for independence is used to compare two variables to find out whether the two variables are related to one another or not, or one can say this test is used to see whether the distribution of categorical variables differ from each other.

The formula for the chi-square test is as follows (Glen, 2020):

$$\chi_c^2 = \sum (\mathbf{O}_i - \mathbf{E}_i) / \mathbf{E}_i$$

Where “c” is the degrees of freedom. “O” is the observed value and “E” is the expected value.

- **Mann-Whitney Test:** To test the differences of the delivery costs of normal delivery and C-section delivery modes. The cost difference between the C-Section and normal delivery would be determined for the complete set of data. The final results would then be analyzed to compare the cost of normal delivery & CS so as to have an idea about how much the total expenditure varies among the two.

The purpose of the Mann Whitney test is to compare if there is any difference in the dependent variable for the two groups. For the Mann-Whitney test to run successfully the data must fulfill certain assumptions such as the dependent variable should be measured on an ordinal scale or continuous scale, secondly the independent variable must be two independent categorical groups, thirdly observations should be independent which means that the observations must not be related between two groups or within a group and lastly observations should not be normally distributed. The formula used for Mann-Whitney test is as follows(Glen).

$$U_1 = R_1 - n_1(n_1 + 1) / 2 \dots\dots\dots eq1$$

**OR**

$$U_2 = R_2 - n_2(n_2 + 1) / 2 \dots\dots\dots eq2$$

- **Multiple Linear/Stepwise Regression Methods:** To determine the main factors that are significant in influencing the delivery cost of normal delivery and C-section delivery for both public and private hospitals.

The multiple linear regression test is referred to the analysis when two or more independent variables are required for a prediction. In other words, it is a statistical technique that can be used to study the relationship between a single dependent and numerous independent variables. A simple linear regression equation can be used to insert multiple independent variables in the following manner(Nugus, 2009).

$$Y = A_0 + A_1 X_1 + A_2 X_2 + \dots\dots\dots A_n X_n \dots\dots\dots eq 1$$

Where “Y” is dependent variable and “X<sub>1</sub>.... X<sub>n</sub>” are independent variable.

Y = Total cost (dependent variable)

X1 = Age (Independent variable)

X2 = Length of stay (Independent variable)

### 3.3.4 Dependent and Independent Variables

Depending upon the objective to be fulfilled and the test implied on the data, dependent and independent variables would vary accordingly. The formulation of which has been discussed below:

- I. For **Chi square test** to determine the significant variables, the formulation of variables is done as follows:
  - Dependent variables: The current mode of delivery (C-section and natural delivery) has been taken as dependent variable. The current mode of delivery referred to the mode of delivery that the mother has currently undergone for her childbirth which was either CS and natural delivery.
  - Independent variables: All the variables like age, education, employment status, birth order, preference of type of hospital, maternal complications, indications, complications and length of stay would be considered as independent variables. However only two variables that are age and length of stay showed significant results. Therefore only these two variables are considered in the study while the remaining insignificant variables were not included. Among the independent variables the age of the mother who has given birth is defined into 4 groups which include: 15-19 years, 20-29years, 30-39 years and 40-49 years. While the length of hospital stay referred to the number of days the mother has stayed in the hospital or is discharged from the

hospital after the child birth either via CS or normal delivery. The number of days are defined as discharged at same day, discharged after 1 day, discharged after 2 days, discharged after 5 or more days.

II. Likewise, for **Man Whitney's test**, the variables taken are as below:

- Dependent Variables: The variables like total delivery cost of the pregnant women with natural delivery and the pregnant women with CS will be taken as dependent variables for Man Whitney. The total delivery cost includes the major possible expenses that the mother family bear which include; Dr's fee/Hospital fee, Lab share, OT share, medicines, surgical items, blood bag, ward bed, private room charges.
- Independent variables: The current mode of delivery (C-section and natural delivery) has been taken as independent variable. The current mode of delivery referred to the mode of delivery that the mother has currently undergone for her childbirth which was either CS and natural delivery.

III. Because we want to analyze the relationship between the factors that contribute towards the increase or decrease of cost associated with C-section and natural delivery and what factors play most of the role in this difference. Therefore, the variables for the **multiple linear regression method** are constructed as follows:

- Dependent Variables: The variables like delivery costs of the pregnant women with natural delivery and the pregnant women with CS will be taken as dependent variables for multiple linear regression method. The delivery costs includes the major possible expenses that the mother family bear which include; Dr's fee/Hospital fee,

Lab share, OT share, medicines, surgical items, blood bag, ward bed, private room charges.

- Independent Variables: The variables like age and length of hospital stay will be considered as independent variables for multiple linear regression method. The age of the mother is categorized into 15-19 years, 20-29years, 30-39 years and 40-49 years. While the length of hospital stay is defined as the number of days the mother after given birth either via CS or normal delivery has stayed in the hospital.

$$Y = A_0 + A_1 X_1 + A_2 X_2 + \dots \dots A_n X_n$$

Y = Total cost (dependent variable)

X1 = Age (Independent variable)

X2 = Length of stay (Independent variable)



## CHAPTER 4

### RESULTS AND INTERPRETATION

#### 4.1 Introduction

In this chapter descriptive Statistics on variable have been applied and discussed. Furthermore, all the results of statistical tests such as chi square test, Mann-Whitney Test and regression analysis to support the objectives of this study have been analyzed and interpreted in this chapter.

#### 4.2 Descriptive Statistics

This chapter begins with the descriptive statistics of all the variables in order to study the characteristics of the variables that are used for the analysis.

Table 4.1, 4.2 and 4.3 represents in detail about the summary of the variables that have been used in the statistical analysis of the study. The statistics are given for the selected sample of hospitals which include public (one) and private hospitals (two). These hospitals were selected on the basis of availability of data especially for dependent and independent variables of interest as well as willingness by the hospital administration to grant permission for data collection. The Variables upon which descriptive statistics have been applied includes: age, monthly income, Parity, Birth Interval, length of hospital stay and total cost on childbirth.

**Table 4.1:** Descriptive Statistics of Public Hospital Data Variables

|                  | <b>Age</b> | <b>Monthly Income</b> | <b>Parity</b> | <b>Birth Interval</b> | <b>Length of Hosp. stay</b> | <b>Total cost on child birth</b> |
|------------------|------------|-----------------------|---------------|-----------------------|-----------------------------|----------------------------------|
| <b>Mean</b>      | 29         | 48055                 | 2.23          | 2.8                   | 2.38                        | 5863.6                           |
| <b>St. Error</b> | 0.75       | 2113.2                | 0.2           | 0.25                  | 0.16                        | 1235.2                           |
| <b>Median</b>    | 28         | 50000                 | 2             | 2                     | 3                           | 0                                |
| <b>St. Dev</b>   | 5.60       | 15672                 | 1.43          | 1.85                  | 1.2                         | 9160.3                           |
| <b>Range</b>     | 21         | 86000                 | 6             | 4                     | 3                           | 35000                            |
| <b>Minimum</b>   | 18         | 4000                  | 1             | 1                     | 1                           | 0                                |
| <b>Maximum</b>   | 39         | 90000                 | 7             | 5                     | 4                           | 35000                            |
| <b>Sum</b>       | 1605       | 2643000               | 123           | 157                   | 131                         | 322500                           |
| <b>Count</b>     | 55         | 55                    | 55            | 55                    | 55                          | 55                               |

**Table 4.2:** Descriptive Statistics of Private Hospital (a) Data Variables

|                  | <b>Age</b> | <b>Monthly Income</b> | <b>Parity</b> | <b>Birth Interval</b> | <b>Length of Hosp. stay</b> | <b>Total cost on child birth</b> |
|------------------|------------|-----------------------|---------------|-----------------------|-----------------------------|----------------------------------|
| <b>Mean</b>      | 28.4       | 67285.7               | 1.7           | 3.03                  | 2.43                        | 46000                            |
| <b>St. Error</b> | 1.02       | 2267.3                | 0.13          | 0.32                  | 0.16                        | 1942                             |
| <b>Median</b>    | 28         | 70000                 | 2             | 2                     | 3                           | 45000                            |
| <b>St. Dev</b>   | 6.02       | 13413.3               | 0.78          | 1.87                  | 0.97                        | 11492                            |
| <b>Range</b>     | 24         | 45000                 | 3             | 4                     | 3                           | 50000                            |
| <b>Minimum</b>   | 18         | 40000                 | 1             | 1                     | 1                           | 25000                            |
| <b>Maximum</b>   | 42         | 85000                 | 4             | 5                     | 4                           | 75000                            |
| <b>Sum</b>       | 995        | 2355000               | 60            | 106                   | 85                          | 1610000                          |
| <b>Count</b>     | 35         | 35                    | 35            | 35                    | 35                          | 35                               |

**Table 4.3:** Descriptive Statistics of Private Hospital (b) Data Variables

|                  | Age  | Monthly Income | Parity | Birth Interval | Length of Hosp. stay | Total cost on child birth |
|------------------|------|----------------|--------|----------------|----------------------|---------------------------|
| <b>Mean</b>      | 30   | 143125         | 1.5    | 3.5            | 2.62                 | 117500                    |
| <b>St. Error</b> | 0.77 | 15902          | 0.18   | 0.45           | 0.18                 | 9196.9                    |
| <b>Median</b>    | 29.5 | 100000         | 1      | 5              | 3                    | 90000                     |
| <b>St. Dev</b>   | 3.07 | 63610          | 0.7    | 1.82           | 0.71                 | 36787                     |
| <b>Range</b>     | 10   | 185000         | 2      | 4              | 3                    | 80000                     |
| <b>Minimum</b>   | 25   | 65000          | 1      | 1              | 1                    | 90000                     |
| <b>Maximum</b>   | 35   | 250000         | 3      | 5              | 4                    | 170000                    |
| <b>Sum</b>       | 478  | 2290000        | 25     | 56             | 42                   | 1880000                   |
| <b>Count</b>     | 16   | 16             | 16     | 16             | 16                   | 16                        |

From the descriptive analysis it has been observed that the mean value of age comes out to be 29 for public hospital (Table 4.1). Whereas, for the private hospital (a) the mean value of age comes out to be 28 and for private hospital (b) the mean value for age is 30. The standard deviation basically serves as a measure of variation of random variables with in a data set, which in turn gives information about the spread of the data. Table 4.1, 4.2 and 4.3 showed the standard deviation of 5.6, 6.02 and 3.07 for public, private (a) and private (b) hospitals respectively.

In case of monthly income, the mean value of monthly income for private hospital (b) is 143215 Rs. which is higher than the private hospital (a) and public hospital with mean values of monthly income as 67485 Rs. and 4805 Rs. Respectively.

The mean value for parity comes out to be 2.23 (Table 4.1) which designates that the pregnant women in case of public hospitals have their second childbirth. While the mean value of parity for private hospital (a) comes out to be 1.7 (table 4.2) which indicates that more mother's have their second delivery. While, from table 4.3 it has been evident that mean value of parity is 1.5 which shows, pregnant women were having their first delivery at private hospital (b).

The mean value for the variable, birth interval from the Tables 4.1, 4.2 and 4.3 comes out to be 2.8, 3 and 3.5 which indicates that the mean gap between the previous and current delivery for pregnant population of all the three hospitals public, private (a) and private (b) hospitals is 3-3.5 years, with standard deviation values of 1.85, 1.87 and 1.82 respectively.

Similarly, the mean value for the length of stay from the tables 4.1, 4.2 and 4.3 comes out to be 2.38, 2.43 and 2.62 and standard deviation values of 1.2, 0.97 and 0.71. This indicates that women's recently delivered a birth from all the three hospitals public and private (a &b) stays at the hospital after birth for 2-3 days before the discharge.

The mean value of total cost on child birth for the private hospital (b) comes out to be 117500 Rs. (Table 4.3) which is higher compared to the other two hospitals. The mean value of total cost on childbirth for private hospital (a) is 46000 Rs. (Table 4.2), followed

by the public hospital whose mean value of total cost on childbirth comes out to be 5863 Rs. (Table 4.1).

### **4.3 Questionnaire and its Data Characteristics**

In this section the characteristics of the data collected via questionnaire from public and private hospitals, is being analyzed and represented in the form of table. The questionnaire as discussed in chapter 3 has been divided into three major realms, first part includes the sociodemographic questions, second part consists of questions regarding obstetrics variables and the last part consists of question related to the total cost on the child birth. Overall, the questionnaire contains 22 questions covering all the variables that are deemed fit for the information required for the fulfillment of objectives of the research study.

#### **4.3.1 Characteristics of data for public and private hospitals**

A total of 55 sample questionnaires have been filled by the women who have given birth in public hospital. While a total of 35 questionnaires have been filled by the women who have given birth in the private hospital (a) and 16 questionnaires have been filled by the mothers in the private hospital (b). The data collected is represented below in table 4.4 to analyze the basic characteristics trend of the data. From the table 4.4, the response characteristic of age of pregnant women who have given birth and have taken part in the study, it has been evident that 51% of mothers belonged to age group 20-29 years, 44% of mothers belonged to age group 30-39years. While, only 5% of mothers belonged to age group 15-19 years. In case of Private hospital (a), 49% of participated mothers

belonged to 20-29 years of age group, 34% of mothers belonged to 30-39 years of age group, 14% belonged to 15-19 years of age group and 1% belonged to the age group 40-49 years of age group. While, in case of private hospital (b), 50% of mothers belonged to the age group 20-29 years and an equal percentage (50%) of mothers belonged to the age group 30-39 years.

The response characteristics of residence/ area of living of the participants shows that majority of the patients were living with in Islamabad with 85% ,97% and 75% of families residing in Islamabad for public, private hospital (a) and private hospital (b) respectively. The response characteristics of level of education for public hospital shows that 21 mothers out of 55 (38%) have attained secondary level of education and the other 18 mothers out of 55 (33%) have attained BA/BSC/MA/MCS level of education. While there are 9 mothers (16%) with no formal education and only 2 mothers (4%) with a university degree. In case of private hospital (a) the response characteristics of level of education shows that 17 mothers out of 35 (49%) have attained higher-secondary level of education and the other 12 mothers out of 35 (34%) have attained secondary level of education. While 4 mothers (11%) with no formal education and only 1 mother (3%) with a university degree. Likewise, for private hospital (b), 14 out of 16 mothers (88%) have a professional degree. While 1 mother (6%) has a higher secondary level of education and 1 mother (6%) has secondary education.

It has been represented in table 4.4 that 31% (17/55) of mothers were employed in case of public hospital data. While 23% (8/35) of mothers were employed in case of private hospital (a) data and the highest percentage of employment has been seen in private hospital (b) where 81% (13/16) of the mothers has been associated with jobs. In case of

monthly income, 49% of the families who have chosen public hospital for their childbirth have a monthly income range 40,000-65,000 Rs. this monthly income range has increased to 65,000-85,000 Rs. for private hospital (a), with 54% of the families belonged to this monthly income range and in case of private hospital (b) 44% of the families belonged to the monthly income range of more than 1,50,000 Rs.

All the mothers that have been admitted for childbirth in public hospital, private hospital (a) and private hospital (b) have mostly having their first child with 40%, 46% and 56% respectively followed by the percentage showing the mothers having second child with the percentages 27%, 40% and 31% for public, private (a) and private (b) hospitals. While in case of public hospital 11% of the mothers have given birth to either 5<sup>th</sup> or 6<sup>th</sup> child, which was not seen in private hospitals.

Previous delivery of the mothers admitted to the public hospital has been done in public hospital with 58% of the total participants. While 42% of the mothers have previously given birth in a private facility. The reason of changing the hospital from private to public hospital was being the change in their residence and the public hospital became more assessable to them and also because of the affordability of private hospital became difficult for them. So, for second or third delivery, these families went to opt for public hospital for the childbirth. On the other hand or private hospital (a), 15 women out of 35 (43%) have undergone their previous delivery in the private hospital while 4 women out of 35 (11%) previously had delivered in a public facility. The reason of changing the facility from public to private hospital was being their unsatisfaction with services provided at the public hospitals. Whereas, in case of private hospital (b), for second or third delivery, these families went to opt for private hospital for the childbirth. 7 women



out of 16 have undergone their previous delivery in the private hospital while 9 women out of 16 previously had delivered in a public facility. The reason of changing the hospital from public to private hospital was to get more satisfied and effective services both medical and non-medical.

All the mothers in the sample data of public hospital (55) have currently undergone their childbirth in the public hospital. Similarly all the mothers in the sample data for private hospital (a) 35 and private hospital (b) 16 have given birth in the private hospitals respectively from where the data has been collected.

It can be observed from the table 4.4 that the response characteristics of previous mode of delivery from the public hospital data indicates that 21 women out of 55 have previously given birth via normal delivery followed by 8 women who have given birth via elective C-section, 3 of the women have undergone emergency C-section for childbirth and 1 woman has opted CS on demand for her previous delivery. While for 22 pregnant women, previous mode of delivery did not apply because they were having their first child currently. Likewise, the response characteristics of previous mode of delivery from private hospital (a) indicates that 11 women out of 35 have previously given birth via normal delivery followed by 7 women who have given birth via emergency C-section and 1 of the woman have undergone elective C-section for childbirth. While for 16 women, previous mode of delivery did not apply because they were having their first child currently. Similarly, the response characteristics of previous mode of delivery from private hospital data indicates that 4 women out of 16 have previously given birth via natural delivery followed by 2 women who have given birth via emergency C-section and 1 of the woman have undergone elective C-section for childbirth. While for 9 pregnant

women, previous mode of delivery did not apply because they were having their first child currently.

The response characteristics of current mode of delivery from the table 4.4 shows that 23 mothers out of total 55 participants have undergone natural delivery process, 13 mothers have undergone elective C-section process, 7 mothers have undergone emergency C-section and 12 mothers have undergone CS on demand for their childbirth. Whereas, for private hospital (a) the response characteristics of current mode of delivery shown that 10 women out of total 35 women have undergone natural delivery process, 9 women have undergone elective C-section process, 11 women have undergone emergency C-section and 5 women have undergone CS on demand for their childbirth. This number in case of private hospital (b) changed to 4 women out of total 16 women have undergone normal delivery process, 2 women have undergone elective C-section process, 8 women have undergone emergency C-section and 2 women have undergone CS on demand for their childbirth.

From the public hospital data it has been evaluated that mostly the reason for undergoing elective C-section is abnormal/breached baby position, followed by previous C-section and overage /high BP/ gestational diabetes. Similarly it is evident from the table 4.4 that the indications for emergency C-section are prolonged labor & failed induction followed by high BP/gestational diabetes and fetal distress. And the major indications for undergoing CS on demand was previous C-section & overage (for 8 out of 55 women), followed by psychological fear of normal delivery process & pain (2 out of 55 women), self decision because of abnormal baby position (1 woman) and self decision because of high BP throughout pregnancy (1 woman). While for private hospital (a), it has been

shown that mostly the reason for undergoing elective C-section is abnormal/breached baby position, followed by previous C-section and overage /high BP/ gestational diabetes. In addition, the indications for emergency C-section are prolonged labor & failed induction followed by high BP/gestational diabetes, fetal distress and lastly also included chord around the neck of the baby. And the major indication for undergoing CS on demand was previous C-section & overage (for 4 out of 35 women), followed by psychological fear of normal delivery process & pain (1 out of 35 woman). However, in case of private hospital (b) data, the major indications for undergoing elective C-section were abnormal/breached baby position. It is evident from the table 4.4, that the indications for emergency C-section are prolonged labor & failed induction followed by fetal distress then high BP/gestational diabetes and lastly also included chord around the neck of the baby. And the major indication for undergoing CS on demand was previous C-section & overage followed by psychological fear of normal delivery process & pain. The table 4.4 indicated that 16% (9 out of 55 women) have complaints regarding the pregnancy complications in case of public hospital data. While in case of private hospital (a) & (b), the results was 14% and 37.5% respectively. From the public hospital data it has been shown that 54 mothers have all their children born alive except for one case. Similarly for private hospital (a) 34 mothers have all their children born alive except for one case. While, for private hospital (b), all the mothers (16 women) have their children born alive.

The response characteristics of complications faced by the women during pregnancy obtained from public hospital have shown that 6 women (11%) have complaint that they have low Hb/low BP/ weakness during the pregnancy, 2 women (3%) complaint about

having high BP/diabetes during the pregnancy and 1(2%) woman experienced severe nausea & vomiting during the pregnancy. The response characteristics of complications faced by the women during pregnancy obtained from private hospital (a) have shown that 3 women (8%) complaint about high BP & gestational diabetes, 1 woman (3%) complaint about having low Hb/low BP/ weakness and 1 woman (3%) experienced generalized body aches during the pregnancy. The response characteristics of complications faced by the women during pregnancy obtained from private hospital (b) have shown that 3 women (19%) complaint about high BP & gestational diabetes, 1 woman (6%) complaint about having low Hb/low BP/ weakness, 1 woman (6%) experienced generalized body aches and 1 woman (6%) complaint about severe nausea and vomiting during the pregnancy.

The response characteristics of birth interval for public hospital, it is evident from the results that 23 women (42%) have 1-2.5 years of gap between their previous and current pregnancy, 6 women (11%) have about 3-4.5 years of gap and 4 women (7%) have 5-6.5 years of gap between the previous and current pregnancy. The response characteristics of birth interval for private hospital (a), it is evident from the results that 12 women (34%) have 1-2.5 years of gap between their previous and current pregnancy, 7 women (20%) have about 3-4.5 years of gap between the previous and current pregnancy. The response characteristics of birth interval for private hospital (b), it is evident from the results that 4 women (25%) have 1-2.5 years of gap between their previous and current pregnancy, 2 women (13%) have about 3-4.5 years of gap between the previous and current pregnancy and 1 woman (6%) have 5-6.5 years of gap between the previous and current pregnancy.

The table 4.4 indicated that 20 women out of 55 (3%) have discharged the same day after the delivering the child, 17 women out of 55 (31%) have stayed in the hospital for 2 days before their discharge, 12 women out of 55(22%) have discharged after 5 days or more after the delivery and 6 women out of 55 (11%) have discharged after 1 day of the delivery from the data obtained from the public hospital. In case of private hospital (a), 9 women out of 35(26%) have discharged the same day after the delivering the child, 18 women out of 35(51%) have stayed in the hospital for 2 days before their discharge, 3 women out of 35 (9%) have discharged after 5 days or more after the delivery and 5 women out of 35(14%) have discharged after 1 day of the delivery. For private hospital (b) it has been indicated in the table 4.4 that 1 woman out of 16 (6%) have discharged the same day after the delivering the child, 5 women out of 16 (31%) have discharged after 1 day of the delivery, 9 women out of 16 (56%) have stayed in the hospital for 2 days before their discharge and 1 woman out of 16 (6%) have discharged after 5 days or more after the delivery.

The response characteristics of total cost on childbirth for the public hospital indicated that 31% of women have a total cost on the childbirth around 30,000 Rs. or less, 5% women have a total cost on the childbirth ranging from 30,000-49,000 Rs. and 35 women out of 55 (64%) have had no major expense on the childbirth because of the fact that these families were on the panel of the hospital as result the hospital have provided the services free of cost to such patients. The major expenses that is included in the total cost of childbirth for the 20 women (36%) included medicines/ surgical items/ blood bags/ ward or private room charges. It has been observed from the table 4.4 that almost all the patients were satisfied by the services provided to them by the public hospital facility.

On the contrary, the response characteristics of total cost on childbirth for the private hospital (a) indicated that 17 women out of the total 35 women (48%) have a total cost on the childbirth around 50,000 - 1 lakh Rs. 16 women (46%) have a total cost on the childbirth ranging from 30,000-49,000 Rs. and 2 women out of 35 (6%) have total expense of less than 30,000 Rs. because they were provided discount on demand. The major expenses that are included in the total cost of childbirth for the 25 women (71%) included medicines/ surgical items/ blood bags/ ward or private room charges/lab share/OT share. while, for the other 10 women (29%) the major expenses included in the total cost of childbirth includes medicines/ surgical items/ blood bags/ ward or private room charges. All the patients were satisfied by the services provided to them by the private hospital facility.

On the other hand, the response characteristics of total cost on childbirth for the private hospital (b) indicate that 62% women have a total cost on the childbirth around 50,000 - 1 lakh Rs. And 38% women have a total cost of more than 1.5 lakh Rs. on the childbirth. The major expenses that are included in the total cost of childbirth for the 94% of women included Dr. fee/ hospital share, medicines/ surgical items/ blood bags/ ward or private room charges/lab share/OT share. The patients have shown satisfaction and partial satisfaction based on their individual experiences by the services provided by the hospital.

Graphical representation of public and private hospitals has also been added in Annexure II.

**Table 4.4:** Response Characteristics of data obtained from the questionnaire by the patients

| <b>Response Characteristics of Data from the Questionnaire</b> |                        |                        |      |                         |      |                         |      |
|--|------------------------|------------------------|------|-------------------------|------|-------------------------|------|
| <b>S.No.</b>   | <b>Characteristics</b> | <b>Public Hospital</b> |      | <b>Private Hospital</b> |      | <b>Private Hospital</b> |      |
|  |                        |                        |      | <b>(a)</b>              |      | <b>(b)</b>              |      |
| <b>Total No. of Patients</b>                                   |                        | 55                     |      | 35                      |      | 16                      |      |
|  |                        | No.                    | %age | No.                     | %age | No.                     | %age |
| 1.   | <b>Age</b>             |                        |      |                         |      |                         |      |
|  | a: 15-19 years         | 3                      | 5%   | 5                       | 14%  | 0                       | 0%   |
|  | b: 20-29 years         | 28                     | 51%  | 17                      | 49%  | 8                       | 50%  |
|  | c: 30-39 years         | 24                     | 44%  | 12                      | 34%  | 8                       | 50%  |
|  | d 40-49 years          | 0                      | 0%   | 1                       | 3%   | 0                       | 0%   |
| 2.   | <b>Residence</b>       |                        |      |                         |      |                         |      |
|  | a: Islamabad           | 47                     | 85%  | 34                      | 97%  | 12                      | 75%  |
|  | b: Rawalpindi          | 7                      | 13%  | 0                       | 0%   | 4                       | 25%  |
|  | c: Others              | 1                      | 2%   | 1                       | 3%   | 0                       | 0%   |
| 3.   | <b>Education</b>       |                        |      |                         |      |                         |      |
|  | a: No Formal Education | 9                      | 16%  | 4                       | 11%  | 0                       | 0%   |
|  | b: Primary             | 5                      | 9%   | 1                       | 3%   | 0                       | 0%   |
|  | c: Secondary           | 21                     | 38%  | 12                      | 34%  | 1                       | 6%   |
|  | d: Higher-Secondary    | 18                     | 33%  | 17                      | 49%  | 1                       | 6%   |

|    |  |    |      |    |     |    |      |
|----|--|----|------|----|-----|----|------|
|    | e: Professional degree                 | 2  | 4%   | 1  | 3%  | 14 | 88%  |
| 4. | <b>Employment</b>                      |    |      |    |     |    |      |
|    | a: Yes                                 | 17 | 31%  | 8  | 23% | 13 | 81%  |
|    | b: No                                  | 38 | 69%  | 27 | 77% | 3  | 19%  |
| 5. | <b>Monthly Income</b>                  |    |      |    |     |    |      |
|    | a: <25000 Rs.                          | 3  | 5%   | 0  | 0%  | 0  | 0%   |
|    | b: 25000-40,000                        | 21 | 38%  | 3  | 9%  | 0  | 0%   |
|    | c: 40,000-65,000                       | 27 | 49%  | 13 | 37% | 1  | 6%   |
|    | d: 65,000-85,000                       | 2  | 4%   | 19 | 54% | 2  | 12%  |
|    | e: 85,000-100,000                      | 2  | 4%   | 0  | 0%  | 6  | 38%  |
|    | f: >150,000 Rs.                        | 0  | 0%   | 0  | 0%  | 7  | 44%  |
| 6. | <b>Preference of Hospital Facility</b> |    |      |    |     |    |      |
|    | a: Public                              | 55 | 100% | 1  | 3%  | 16 | 100% |
|    | b: Private                             | 0  | 0%   | 34 | 97% | 0  | 0%   |
| 7  | <b>Parity</b>                          |    |      |    |     |    |      |
|    | a: First                               | 22 | 40%  | 16 | 46% | 9  | 56%  |
|    | b: Second                              | 15 | 27%  | 14 | 40% | 5  | 31%  |
|    | c: Third                               | 9  | 16%  | 4  | 11% | 2  | 12%  |
|    | d: Fourth                              | 3  | 6%   | 1  | 3%  | 0  | 0%   |
|    | e: Others                              | 6  | 11%  | 0  | 0%  | 0  | 0%   |
| 8. | <b>Previous Delivery (Facility)</b>    |    |      |    |     |    |      |
|    | a: Public                              | 32 | 58%  | 4  | 11% | 0  | 0%   |



|     |  |    |      |    |      |    |      |
|-----|--|----|------|----|------|----|------|
|     | b: Private                               | 23 | 42%  | 15 | 43%  | 7  | 48%  |
|     | c: Not applied                           | 0  | 0%   | 16 | 46%  | 9  | 56%  |
| 9.  | <b>Current Delivery (Facility)</b>       |    |      |    |      |    |      |
|     | a: Public                                | 55 | 100% | 0  | 0%   | 0  | 0%   |
|     | b: Private                               | 0  | 0%   | 35 | 100% | 16 | 100% |
| 10. | <b>Mode of Previous Delivery</b>         |    |      |    |      |    |      |
|     | a: Normal Delivery                       | 21 | 38%  | 11 | 31%  | 4  | 25%  |
|     | b: Elective C-section                    | 8  | 15%  | 1  | 3%   | 1  | 6%   |
|     | c: Emergency C-section                   | 3  | 5%   | 7  | 20%  | 2  | 13%  |
|     | d: CS on demand                          | 1  | 2%   | 0  | 0%   | 0  | 0%   |
|     | e: Not Applied                           | 22 | 40%  | 16 | 46%  | 9  | 56%  |
| 11. | <b>Mode of Current Delivery</b>          |    |      |    |      |    |      |
|     | a: Normal Delivery                       | 23 | 42%  | 10 | 29%  | 4  | 25%  |
|     | b: Elective C-section                    | 13 | 23%  | 9  | 26%  | 2  | 13%  |
|     | c: Emergency C-section                   | 7  | 13%  | 11 | 31%  | 8  | 50%  |
|     | d: CS on demand                          | 12 | 22%  | 5  | 14%  | 2  | 12%  |
| 12. | <b>Indications of Elective C-section</b> |    |      |    |      |    |      |
|     | a: Abnormal/breached baby position       | 8  | 15%  | 4  | 11%  | 2  | 12%  |
|     | b: Previous CS                           | 4  | 7%   | 4  | 11%  | 0  | 0%   |
|     | c: Overage, high                         |    |      |    |      |    |      |

|     |   |    |     |    |     |    |     |
|-----|---|----|-----|----|-----|----|-----|
|     | BP/Gestational diabetes                   | 1  | 2%  | 1  | 3%  | 0  | 0%  |
|     | d: None                                   | 42 | 76% | 26 | 74% | 14 | 88% |
| 13. | <b>Indications of Emergency C-section</b> |    |     |    |     |    |     |
|     | a:HighBP/Gestational diabetes             | 1  | 2%  | 3  | 9%  | 1  | 6%  |
|     | b:Prolonged Labor/<br>Failed induction    | 5  | 9%  | 3  | 9%  | 3  | 19% |
|     | c:Chord around the neck of baby           | 0  | 0%  | 2  | 5%  | 1  | 6%  |
|     | d: Fetal Distress                         | 1  | 2%  | 3  | 9%  | 3  | 19% |
|     | e: None                                   | 48 | 87% | 24 | 68% | 8  | 50% |
| 14. | <b>Indications of C-section on demand</b> |    |     |    |     |    |     |
|     | a:Abnormal baby position                  | 1  | 2%  | 0  | 0%  | 0  | 0%  |
|     | b: Psychological fear                     | 2  | 4%  | 1  | 3%  | 1  | 6%  |
|     | c:High BP                                 | 1  | 2%  | 0  | 0%  | 0  | 0   |
|     | d:Previous CS & Overage                   | 8  | 14% | 4  | 11% | 1  | 6%  |
|     | e: None                                   | 43 | 78% | 30 | 86% | 14 | 88% |
| 15. | <b>Complications during Pregnancy</b>     |    |     |    |     |    |     |

|     |                                   |    |     |    |     |    |       |
|-----|-----------------------------------|----|-----|----|-----|----|-------|
|     | a: Yes                            | 9  | 16% | 5  | 14% | 6  | 37.5% |
|     | b: No                             | 46 | 84% | 30 | 86% | 10 | 62.5% |
| 16. | <b>No. of live Sibling/Issues</b> |    |     |    |     |    |       |
|     | a: Yes                            | 54 | 98% | 34 | 97% | 16 | 100%  |
|     | b: No                             | 1  | 2%  | 1  | 3%  | 0  | 0%    |
| 17. | <b>Name of Complications</b>      |    |     |    |     |    |       |
|     | a:LowHb/BP/weakness               | 6  | 11% | 1  | 3%  | 1  | 6%    |
|     | b: Generalized body aches         | 0  | 0%  | 1  | 3%  | 1  | 6%    |
|     | c:Severe nausea & vomiting        | 1  | 2%  | 0  | 0%  | 1  | 6%    |
|     | d:High BP & Gestational Diabetes  | 2  | 3%  | 3  | 8%  | 3  | 19%   |
|     | e: None                           | 46 | 84% | 30 | 86% | 10 | 63%   |
| 18. | <b>Birth Interval</b>             |    |     |    |     |    |       |
|     | a: 12.5 years                     | 23 | 42% | 12 | 34% | 4  | 25%   |
|     | b: 3-4.5 years                    | 6  | 11% | 7  | 20% | 2  | 13%   |
|     | c: 5-6.5 years                    | 4  | 7%  | 0  | 0%  | 1  | 6%    |
|     | d: 7-8.5 years                    | 0  | 0%  | 0  | 0%  | 0  | 0%    |
|     | e: None                           | 22 | 40% | 16 | 46% | 9  | 56%   |

|     |   |    |     |    |     |    |     |
|-----|---|----|-----|----|-----|----|-----|
| 19. | <b>Length of Hospital Stay</b>                                  |    |     |    |     |    |     |
|     | a: Discharged the same day                                      | 20 | 36% | 9  | 26% | 1  | 6%  |
|     | b: after 1 day  | 6  | 11% | 5  | 14% | 5  | 31% |
|     | c: After 2 days   | 17 | 31% | 18 | 51% | 9  | 56% |
|     | d: > 5 days   | 12 | 22% | 3  | 9%  | 1  | 6%  |
| 20. | <b>Total Cost on Childbirth</b>                                 |    |     |    |     |    |     |
|     | a: < 30,000 Rs.   | 17 | 31% | 2  | 6%  | 0  | 0%  |
|     | b: 30,000-49,000  | 3  | 5%  | 16 | 46% | 0  | 0%  |
|     | c: 50,000-100,000   | 0  | 0%  | 17 | 48% | 10 | 62% |
|     | d: > 1.5 lac  | 0  | 0%  | 0  | 0%  | 6  | 38% |
|     | e: None   | 35 | 64% | 0  | 0%  | 0  | 0%  |
| 21. | <b>Breakup of Expenses</b>                                      |    |     |    |     |    |     |
|     | a: Dr's Fee/Hosp Fee  | 0  | 0%  | 0  | 0%  | 0  | 0%  |
|     | b: Medicines/surgical items/blood bags/ward bed/room charges    | 20 | 36% | 10 | 29% | 0  | 0%  |
|     | c: Lab share/OT share   | 0  | 0%  | 0  | 0%  | 0  | 0%  |
|     | d: Dr's Share/medicines/surgical items/blood bags/ward bed/room | 0  | 0%  | 25 | 71% | 1  | 6%  |

|     |                                |    |     |    |      |    |     |
|-----|--------------------------------|----|-----|----|------|----|-----|
|     | charges/OT share/<br>Lab share |    |     |    |      |    |     |
|     | e: All of the above            | 0  | 0%  | 0  | 0%   | 15 | 94% |
|     | d: None                        | 35 | 64% | 0  | 0%   | 0  | 0%  |
| 22. | <b>Level of Satisfaction</b>   |    |     |    |      |    |     |
|     | a: Yes                         | 54 | 98% | 35 | 100% | 8  | 50% |
|     | b: No                          | 0  | 0%  | 0  | 0%   | 0  | 0%  |
|     | c: Partially Satisfied         | 1  | 2%  | 0  | 0%   | 8  | 50% |

#### **4.4 Objective 1: Analysis of Natural delivery rates and CS rates in tertiary hospitals in Islamabad**

In this section, the objective no. 1 of the study that is incidence rates and distribution of both the natural delivery and C-section have been analyzed and represented in the form of tables. Also, the frequency/distribution of indications related to CS (elective CS, emergency CS and CS on demand) has also been analyzed and presented in tabular form. The section is further sub divided into three subsections to discuss the analysis of all the three hospitals which included one public hospital and two private hospitals.

##### **4.4.1 Distribution of natural delivery and CS rates in public hospital**

The results for the distribution of natural delivery and C-section rates in the public hospital have been obtained by adopting Chi square testing. The variables i.e., age and length of stay has shown significant results by the Chi square testing. Table 4.5 represents the results for distribution of different modes of delivery in the public hospital. The total

no. of samples is 55, among which 23 cases were of natural delivery while 32 cases were of C-section. The rates of natural delivery and CS significantly different from the age group 15-19 years to 39-49 years with the p value of 0.02 ( $< 0.05$ ). it is evident from the table 4.4 that the rates of natural delivery were 8.69% higher than CS (3.12%) among the age group 15-19 years. The natural delivery rates were 69.56% higher than CS (37.5%) among the age group 20-29 years. While, the rates of CS were 59.4% greater than the natural delivery rates (21.7%). Similarly, the rates of CS and natural delivery rates were significantly different for the length of stay at the hospital after the child birth ( $p= 0.000 < 0.05$ ). The rates of natural delivery patients discharged at the same day after childbirth were 86.95% compared to the C-section patients (0%). The rates of natural delivery patients discharged after 1 day were 13.04 % more than the CS (9.37%). However, the rates of CS patients discharged after 2 days were 53.12% greater than the natural delivery patients (0%).and similarly the rates of CS patients discharged after 5 days were 37.5% higher than the natural delivery patients (0%) of the same length of stay.

**Table 4.5:** Distribution of different modes of delivery for public hospital

| Category                  | Sum        | Natural Delivery | C-Section   |              |              |            | $\chi^2$ | p     |
|---------------------------|------------|------------------|-------------|--------------|--------------|------------|----------|-------|
|                           |            |                  | Elective CS | Emergency CS | CS on demand | Sum (N)    |          |       |
| <b>Total No. of cases</b> | N=55       | N=23             | 13          | 7            | 12           | N= 32      |          |       |
| <b>Age:</b>               |            |                  |             |              |              |            |          |       |
| 15-19 yr                  | 3(5.45%)   | 2(8.69%)         | 0           | 1(14.2%)     | 0            | 1(3.12%)   | 14.8     | 0.02  |
| 20-29 yr                  | 28(50.9%)  | 16(69.56%)       | 6(46%)      | 4(57%)       | 2(16.66%)    | 12(37.5%)  |          |       |
| 30-39 yr                  | 24(43.63%) | 5(21.7%)         | 7(53.8%)    | 2(28.57%)    | 10(83.33%)   | 19(59.4%)  |          |       |
| 40-49 yr                  | -          | -                | -           | -            | -            | -          |          |       |
| <b>Length of stay:</b>    |            |                  |             |              |              |            |          |       |
| Discharged the same day   | 20(36.36%) | 20(86.95%)       | -           | -            | -            | -          | 52.5     | 0.000 |
| After 1 day               | 6(11%)     | 3(13.04%)        | 1(7.7%)     | -            | 2(16.66%)    | 3(9.37%)   |          |       |
| After 2 days              | 17(31%)    | -                | 7(53.84%)   | 3(42.85%)    | 7(58.33%)    | 17(53.12%) |          |       |
| >5 days                   | 12(21.8%)  | -                | 5(38.46%)   | 4(57.14%)    | 3(25%)       | 12(37.5%)  |          |       |

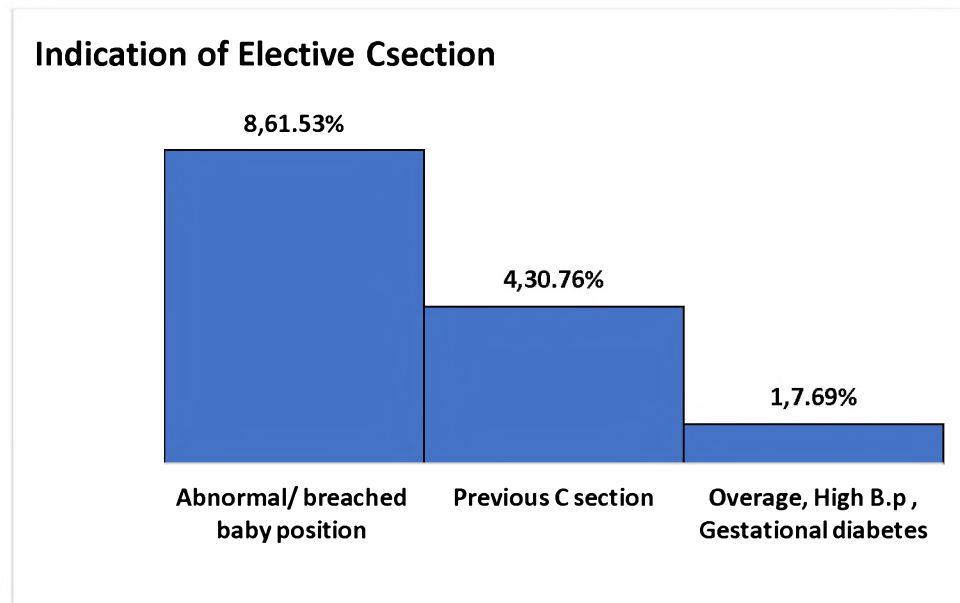
#### 4.4.1.1 Frequency of indications for elective CS

The total number of C-section cases in the public hospital was N=32 which were further divided into Elective CS (13), Emergency CS (7) and CS on demand (12). The frequency of indications for each type of the C-section delivery has been evaluated in the table 4.6, 4.7 and 4.8 and has also been presented as bar charts as fig 4.1, 4.2 & 4.3.

Table 4.6 indicated the results for the frequency of indications for elective CS and found out that abnormal/breached baby position (8, 61.53%) > previous CS (4, 30.76%) > overage/high BP/gestational diabetes (1, 7.69%).

**Table 4.6:** Frequency of indications for elective CS

| Indications                                      | Frequency | %age   | Total no. cases |
|--|-----------|--------|-----------------|
| 1. Abnormal/<br>breached baby<br>position        | 8         | 61.53% | 13              |
| 2. Previous C<br>section                         | 4         | 30.76% |                 |
| 3. Overage, High<br>B.P, Gestational<br>diabetes | 1         | 7.69%  |                 |



*Figure 4.1:* Response characteristics of Indications of elective C-section

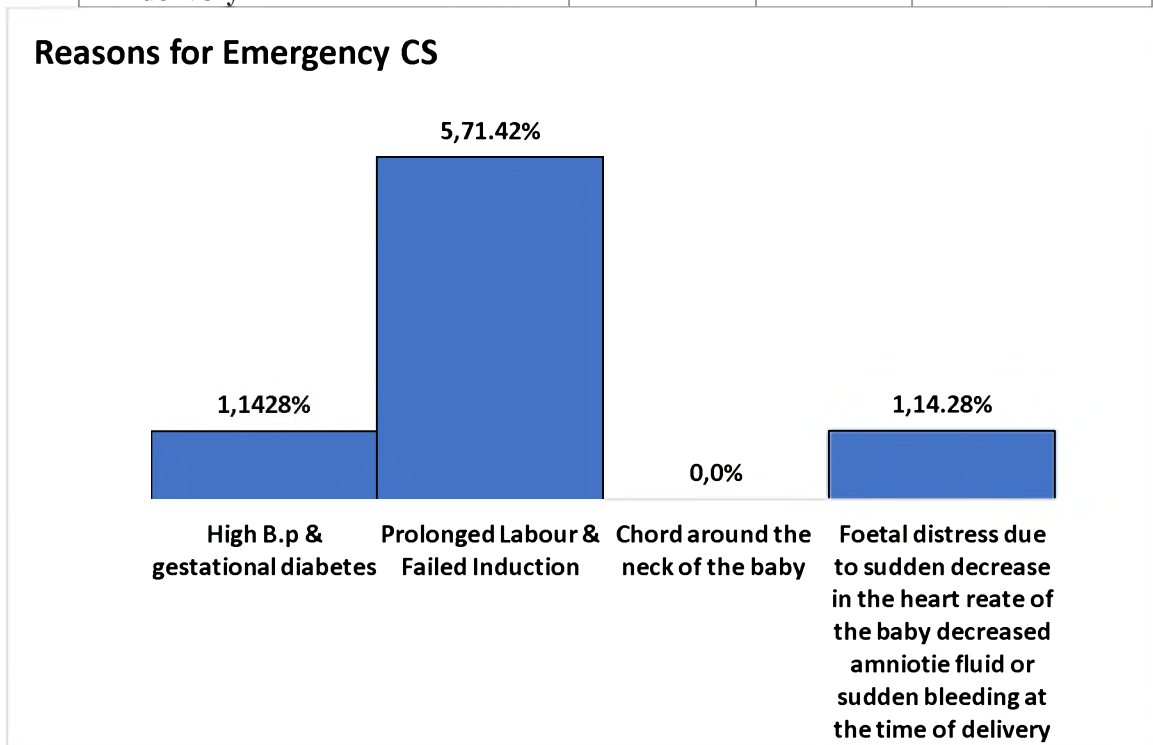
#### 4.4.1.2 Frequency of indications for emergency CS

Table 4.7 indicated the results for the frequency of indications for emergency CS and found out that Prolonged Labor & Failed Induction (5, 71.42%) > high BP/gestational diabetes (1, 14.28%) & Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery (1, 14.28%).



**Table 4.7:** Frequency of indications for emergency CS

| Indications   | Frequency | %age   | Total cases no. |
|---|-----------|--------|-----------------|
| 1. High B.P & gestational diabetes  | 1         | 14.28% | 7               |
| 2. Prolonged Labor & Failed Induction   | 5         | 71.42% |                 |
| 3. Chord around the neck of the baby  | 0         | 0%     |                 |
| 4. Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery | 1         | 14.28% |                 |



*Figure 4.2:* Response characteristics of Indications of emergency C-section

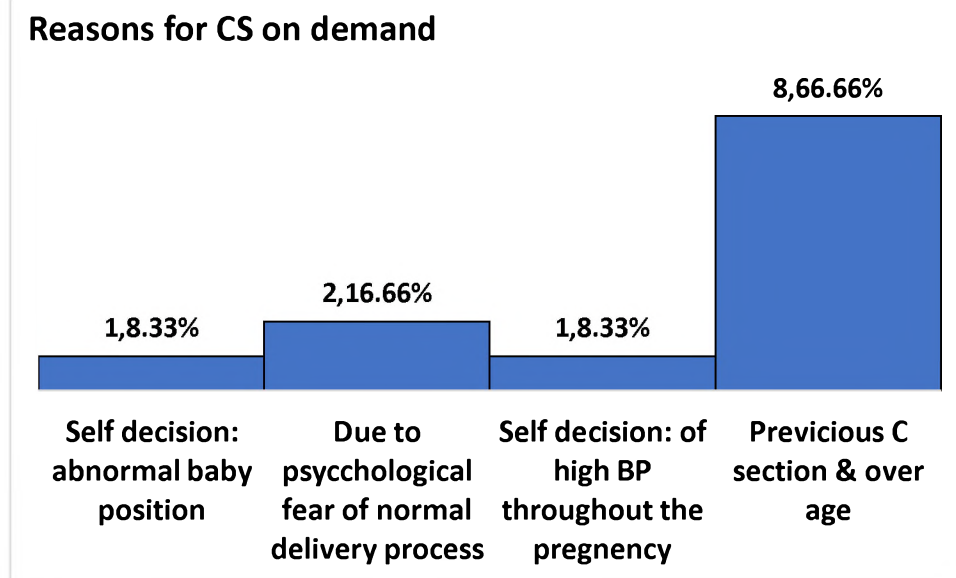
**4.4.1.3 Frequency of indications for CS on demand**

Table 4.8 indicated the results for the frequency of indications for CS on demand and found out that Previous C section & over age (8,66.66%) > Due to psychological fear of

normal delivery process (2,16.66%) > Self decision: abnormal baby position (1, 8.33%) & Self decision: because of high BP throughout the pregnancy (1, 8.33%).

**Table 4.8:** Frequency of indications for CS on demand

| Indications   | Frequency | %age   | Total cases | no. |
|---|-----------|--------|-------------|-----|
| 1. Self decision: abnormal baby position                | 1         | 8.33%  | 12          |     |
| 2. Due to psychological fear of normal delivery process | 2         | 16.66% |             |     |
| 3. Self decision: of high BP throughout the pregnancy   | 1         | 8.33%  |             |     |
| 4. Previous C section & over age                        | 8         | 66.66% |             |     |



**Figure 4.3:** Response characteristics of Indications of C-section on demand

#### 4.4.2 Distribution of natural delivery and CS rates in private hospital (a)

The results for the distribution of natural delivery and C-section rates in the private hospital (a) have been obtained by adopting Chi square testing. The variable length of stay has shown significant results by the Chi square testing. Table 4.9 represents the results for distribution of different modes of delivery in the private hospital (a). The total

no. of samples is 35, among which 10 cases were of natural delivery while 25 cases were of C-section. The rates of CS and normal delivery rates were significantly different for the length of stay at the hospital after the child birth ( $p= 0.000 < 0.05$ ). The rates of natural delivery patients discharged at the same day after childbirth were 90% compared to the C-section patients (0%). The rates of CS delivery patients discharged after 1 day were 16% higher than the normal delivery patients (10%). Similarly, the rates of CS patients discharged after 2 days were 72 % greater than the natural delivery patients (0%). Likewise, the rates of CS patients discharged after 5 days were 12% higher than the natural delivery patients (0%) for the same length of stay.

**Table 4.9:** Distribution of different modes of delivery for private hospital (a)

| Category                  | Sum        | Natural Delivery | C-Section   |              |              |         | $\chi^2$ | p    |
|---------------------------|------------|------------------|-------------|--------------|--------------|---------|----------|------|
|                           |            |                  | Elective CS | Emergency CS | CS on demand | Sum (N) |          |      |
| <b>Total No. of cases</b> | N=35       | N=10             | 9           | 11           | 5            | N=25    |          |      |
| <b>Length of stay:</b>    |            |                  |             |              |              |         |          |      |
| Discharged the same day   | 9(25.71%)  | 9(90%)           | -           | -            | -            | -       | 34.32    | 0.00 |
| After 1 day               | 5(14.28%)  | 1(10%)           | 2(22.22%)   | 1(9.09%)     | 1(20%)       | 4(16%)  |          |      |
| After 2 days              | 18(51.42%) | -                | 7(77.77%)   | 8(72.72%)    | 3(60%)       | 18(72%) |          |      |
| >5 days                   | 3(8.57%)   | -                | -           | 2(18.18%)    | 1(20%)       | 3(12%)  |          |      |

#### 4.4.2.1 Frequency of indications for elective CS

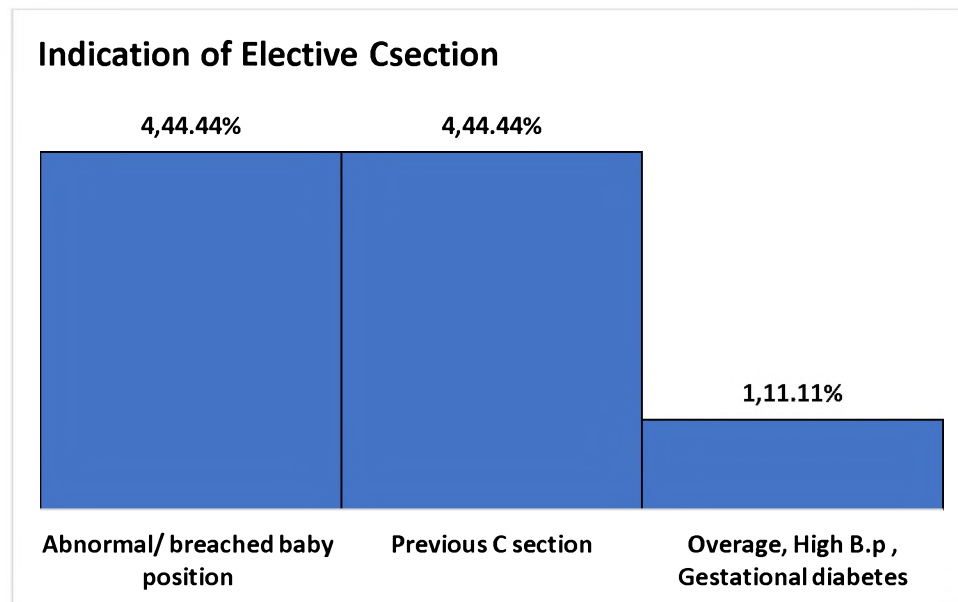
The total number of C-section cases in the private hospital (a) was N=25 which were further divided into Elective CS (9), Emergency CS (11) and CS on demand (5). The frequency of indications for each type of the C-section delivery has been evaluated in

the table 4.10, 4.11 and 4.12 respectively and the same has been presented in the form of bar charts as fig 4.4, 4.5 & 4.6.

Table 4.10 indicated the results for the frequency of indications for elective CS and found out that abnormal/breached baby position (4, 44.44%) & previous CS (4, 44.44%) > overage/high BP/gestational diabetes (1, 11.11%).

**Table 4.10:** Frequency of indications for elective CS

| Indications                                | Frequency | %age   | Total no. cases |
|--|-----------|--------|-----------------|
| 1. Abnormal/ breached baby position        | 4         | 44.44% | 9               |
| 2. Previous C section                      | 4         | 44.44% |                 |
| 3. Overage, High B.P, Gestational diabetes | 1         | 11.11% |                 |



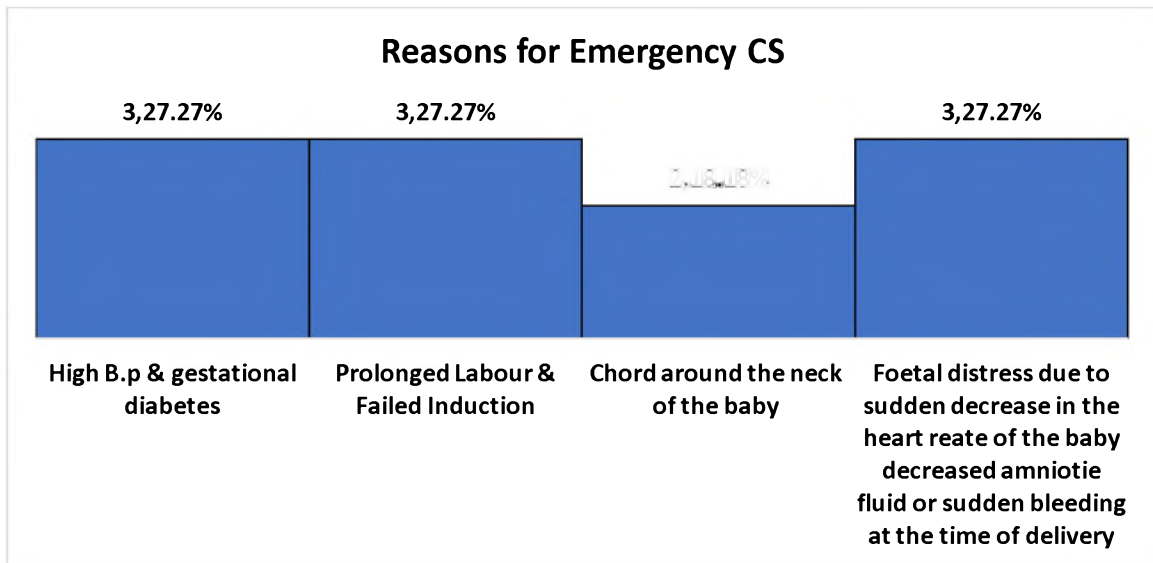
**Figure 4.4:** Response characteristics of indications of elective C-section

#### 4.4.2.2 Frequency of indications for emergency CS

Table 4.11 indicated the results for the frequency of indications for emergency CS and found out that Prolonged Labor & Failed Induction (3, 27.27%), high BP/gestational diabetes (3, 27.27%), & Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery (3, 27.27%) > Chord around the neck of the baby (2, 18.18%).

**Table 4.11:** Frequency of indications for emergency CS

| <b>Indications</b>   | <b>Frequency</b> | <b>%age</b> | <b>Total cases no.</b> |
|--|------------------|-------------|------------------------|
| <b>1. High B.P &amp; gestational diabetes</b>  | 3                | 27.27%      | 11                     |
| <b>2. Prolonged Labor &amp; Failed Induction</b>   | 3                | 27.27%      |                        |
| <b>3. Chord around the neck of the baby</b>  | 2                | 18.18%      |                        |
| <b>4. Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery</b> | 3                | 27.27%      |                        |
|  |                  |             |                        |



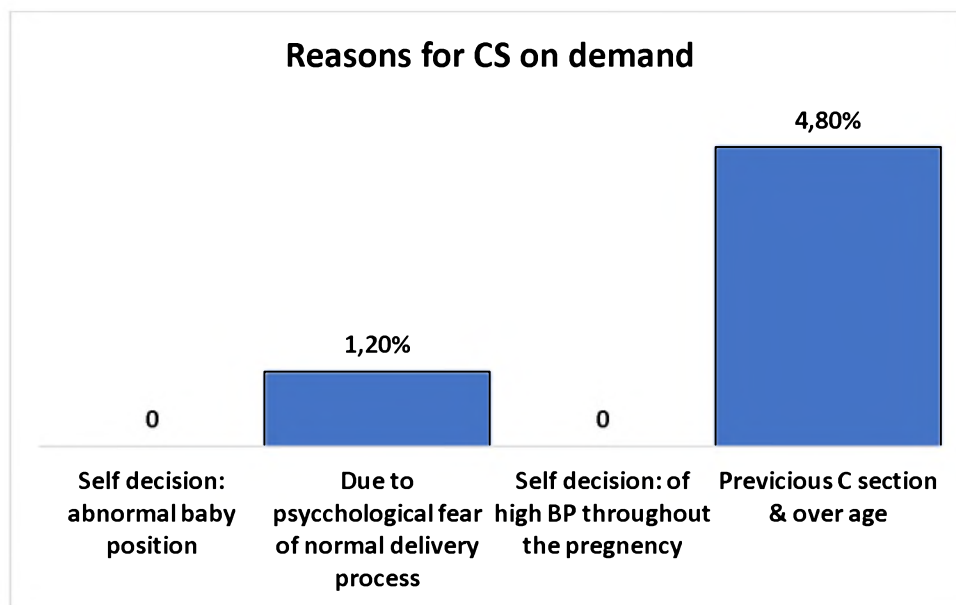
*Figure 4.5:* Response characteristics of indications of emergency C-section

#### 4.4.2.3 Frequency of indications for CS on demand

Table 4.12 indicated the results for the frequency of indications for CS on demand and found out that Previous C section & over age (4, 80 %) > Due to psychological fear of normal delivery process (1, 20%).

**Table 4.12:** Frequency of indications for CS on demand

| Indications   | Frequency | %age | Total cases | no. |
|---|-----------|------|-------------|-----|
| 1. Self decision: abnormal baby position                | 0         | 0    | 5           |     |
| 2. Due to psychological fear of normal delivery process | 1         | 20%  |             |     |
| 3. Self decision: of high BP throughout the pregnancy   | 0         | 0    |             |     |
| 4. Previous C section & over age                        | 4         | 80%  |             |     |



*Figure 4.6:* Response characteristics of indications of CS on demand

#### 4.4.3 Distribution of natural delivery and CS rates in private hospital (b)

The result for the distribution of natural delivery and C-section rates in the private hospital (b) has been obtained by adopting Chi square testing. The variable length of stay has shown significant results by the Chi square testing. Table 4.13 represents the results for distribution of different modes of delivery in the private hospital (b). The total no. of samples is 16, among which 4 cases were of normal delivery while 12 cases were of C-section. The rates of CS and natural delivery rates were significantly different for the length of stay at the hospital after the child birth ( $p= 0.04 < 0.05$ ). The rates of natural delivery patients discharged at the same day after childbirth were 25% compared to the C-section patients (0%). The rates of natural delivery patients discharged after 1 day were 75% higher than the CS patients (16.66%). On the contrary, the rates of CS patients discharged after 2 days were 75 % greater than the natural delivery patients (0%).

Likewise, the rates of CS patients discharged after 5 days were 8.33% higher than the natural delivery patients (0%) for the same length of stay.

**Table 4.13:** Distribution of different modes of delivery for private hospital (b)

| Category                  | Sum       | Natural Delivery | C-Section   |              |              |           | $\chi^2$ | p    |
|---------------------------|-----------|------------------|-------------|--------------|--------------|-----------|----------|------|
|                           |           |                  | Elective CS | Emergency CS | CS on demand | Sum (N)   |          |      |
| <b>Total No. of cases</b> | N=16      | N=4              | 2           | 8            | 2            | N=12      |          |      |
| <b>Length of stay:</b>    |           |                  |             |              |              |           |          |      |
| Discharged the same day   | 1(6.25%)  | 1(25%)           | -           | -            | -            | -         | 17.24    | 0.04 |
| After 1 day               | 5(31.25%) | 3(75%)           | -           | 2(25%)       | -            | 2(16.66%) |          |      |
| After 2 days              | 9(56.25%) | -                | 2(100%)     | 6(75%)       | 1(50%)       | 9((75%)   |          |      |
| >5 days                   | 1(6.25%)  | -                | -           | -            | 1(50%)       | 1(8.33%)  |          |      |

#### 4.4.3.1 Frequency of indications for elective CS

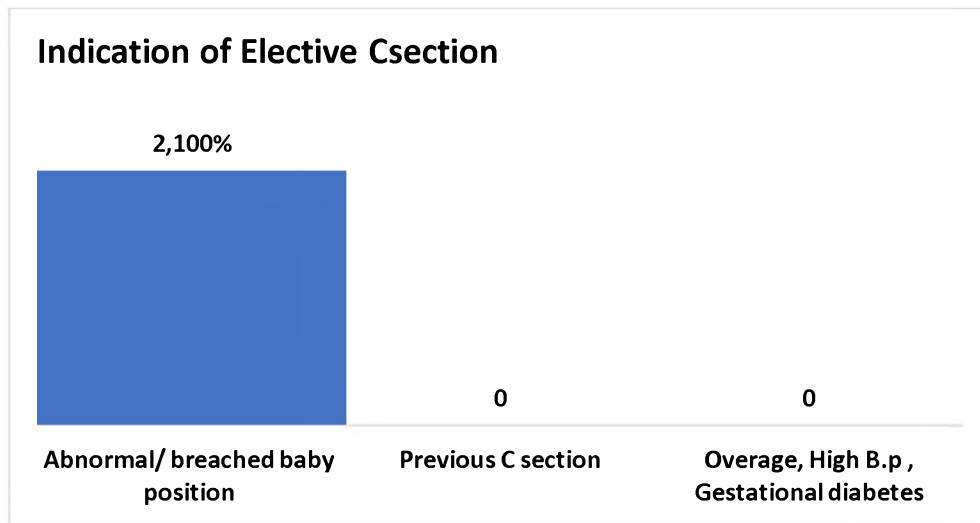
The total number of C-section cases in the private hospital (b) was N=16 which was further divided into Elective CS (2), Emergency CS (8) and CS on demand (2). The frequency of indications for each type of the C-section delivery has been evaluated in the tables 4.14, 4.15 and 4.16 respectively and the same has been presented in the form of bar charts as fig 4.7, 4.8 & 4.9.

Table 4.14 indicated the results for the frequency of indications for elective CS and found out that the frequency of abnormal/breached baby position (100%) > previous CS (0) & overage/high BP/gestational diabetes (0).



**Table 4.14:** Frequency of indications for elective CS

| Indications                                | Frequency | %age | Total no. cases |
|--|-----------|------|-----------------|
| 1. Abnormal/ breached baby position        | 2         | 100% | 2               |
| 2. Previous C section                      | 0         | 0    |                 |
| 3. Overage, High B.P, Gestational diabetes | 0         | 0    |                 |



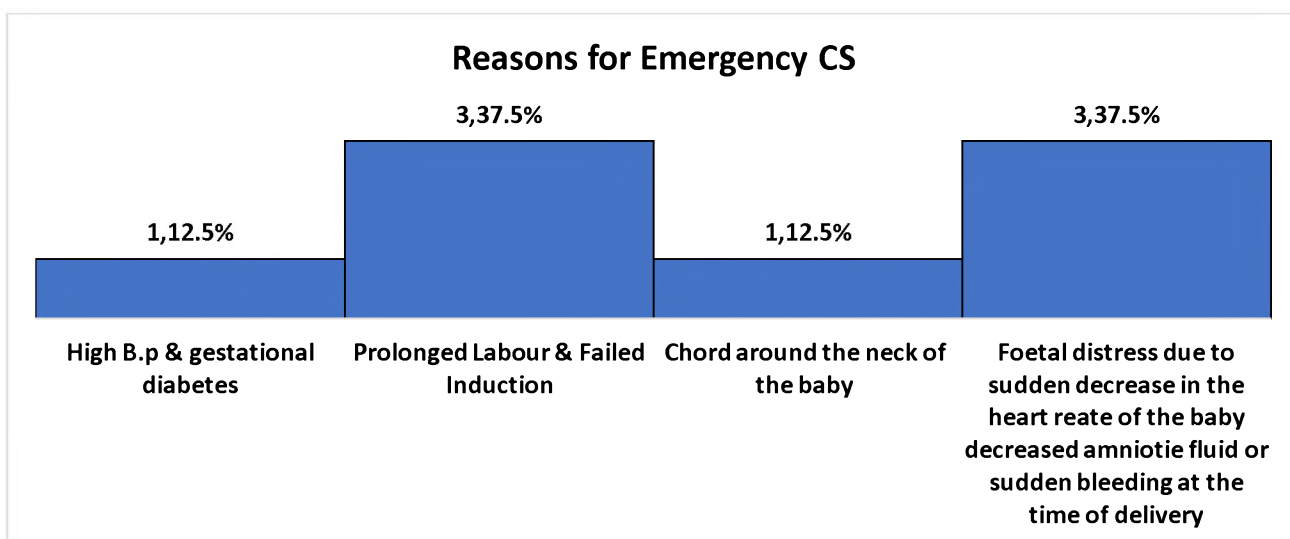
*Figure 4.7:* Response characteristics of indications of elective C-section

#### 4.4.3.2 Frequency of indications for emergency CS

Table 4.15 indicated the results for the frequency of indications for emergency CS and found out that the frequency of prolonged labor & failed induction (3, 37.5%) & Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery (3, 37.5%) > high BP/gestational diabetes (1, 12.5%) & Chord around the neck of the baby (1, 12.5%).

**Table 4.15:** Frequency of indications for emergency CS

| Indications   | Frequency | %age  | Total no. cases |
|---|-----------|-------|-----------------|
| 1. High B.P & gestational diabetes  | 1         | 12.5% | 8               |
| 2. Prolonged Labor & Failed Induction   | 3         | 37.5% |                 |
| 3. Chord around the neck of the baby  | 1         | 12.5% |                 |
| 4. Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery | 3         | 37.5% |                 |



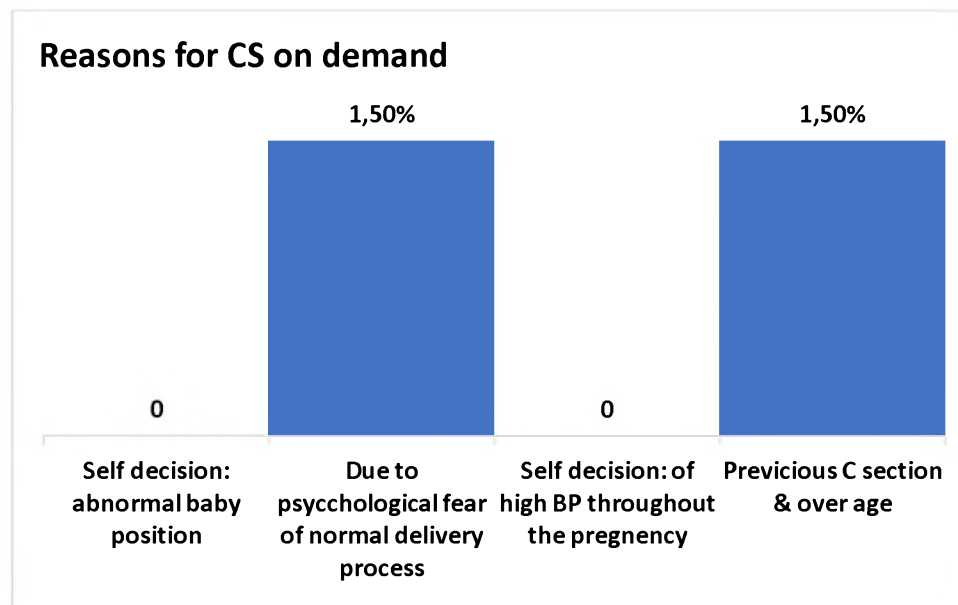
**Figure 4.8:** Response characteristics of indications of emergency C-section

#### 4.4.3.3 Frequency of indications for CS on demand

Table 4.16 indicated the results for the frequency of indications for CS on demand and found out that the frequency of psychological fear of normal delivery process (1, 50%) & previous C-section & over age (1, 50 %) > Self decision: abnormal baby position (0) & Self decision: because of high BP throughout the pregnancy (0).

**Table 4.16:** Frequency of indications for CS on demand

| Indications   | Frequency | %age | Total no. cases |
|---|-----------|------|-----------------|
| 1. Self decision: abnormal baby position                      | 0         | 0    | 2               |
| 2. Due to psychological fear of normal delivery process       | 1         | 50%  |                 |
| 3. Self decision: because of high BP throughout the pregnancy | 0         | 0    |                 |
| 4. Previous C section & over age                              | 1         | 50%  |                 |



*Figure 4.9:* Response characteristics of indications of CS on demand

#### **4.5 Objective 2: Determination of cost difference between natural delivery and C-section**

The cost difference between the different modes of delivery (natural delivery and CS) has been evaluated using the Mann-Whitney test and the results are

summarized in the table below. The Purpose of the Mann Whitney test is to compare if there is any difference in the dependent variable i.e. Cost, between the two modes of delivery e.g. natural delivery and the C-section. From the analyzed data it has been shown in table 4.17 that the cost of natural delivery & CS increases among the age groups from 15-19 years to 40-49 years. In addition, there is significant difference among the costs of natural delivery and CS. The cost of CS is higher than the cost of natural delivery among the age groups 15-19 years, 20-29 years and 40-49 years except for the age group 30-39 years where the cost of normal delivery is higher than the cost of CS. The results indicates that the maternal age and total cost are significantly different ( $p=0.00$ ). Also, if we notice the total cost among the maternal age groups for the same mode of delivery such as natural delivery, it is evident that as the maternal age increases the total cost has also increased from 3000Rs. to 60,000 Rs. for the maternal age groups 15-19 years to 30-39 years respectively. Same is the case for the CS, where the total cost increases from 42,000 Rs. to 55,000 Rs. for the maternal age groups 15-19 years to 40-49 years.

Table 4.17 also indicated from the results length of stay and the total cost on child birth are also significantly different ( $p=0.000$ ) and also it can be concluded that as the length of stay increases the total cost also increases. However, the cost of natural delivery for more than 1 day stay at hospital comes out to be Rs. 90,000 which is more if compared to the cost of C-section for the same no. of hospital stay that is Rs. 40,000. This might be because of the hospital type the

patient has selected i.e., the patient has delivered in the private hospital where the cost automatically is higher compared to the public setting.

From our data analyzation it has been clear that the rate of C-section delivery has increased with the maternal age and also the length of stay of the patients that underwent C-section delivery is greater compared to the natural delivery women as has been concluded above in objective 1. In objective 2, it has been made clear from the data that the cost increase is associated with the maternal age and length of stay. The possible reason for this increase in cost with the increasing maternal age and increased length of hospital stay may be attributed to the facts that women with increased maternal age have moderate to severe complications and have difficulty in deliveries leading to increase rates of CS. Besides, women with CS have longer hospital stay which in turn require increased medical staffing and medical care resulting in the increased total cost. The current study results can be compared to the study conducted by He Z et al (2016), that showed similar results in which the researchers have studied the cost and their determinants of cesarean section and vaginal delivery in Chongqing Municipality, China. The same has been explained in the discussion chapter.

**Table 4.17:** Comparison of delivery cost among different modes of delivery

| Category               | Natural delivery |               | C-section delivery |               | p*    |
|------------------------|------------------|---------------|--------------------|---------------|-------|
|                        | Median           | Cost Range    | Median             | Cost Range    |       |
| <b>Age:</b>            |                  |               |                    |               |       |
| 15-19 yr               | 3000             | 3000          | 42,500             | 5000 - 60,000 | 0.000 |
| 20-29 yr               | 30,000           | 2500-90,000   | 50,000             | 6500- 170,000 |       |
| 30-39 yr               | 60,000           | 5000-160,000  | 42,500             | 7000- 170,000 |       |
| 40-49yr                | -                | -             | 55,000             | 55,000        |       |
| <b>Length of stay:</b> |                  |               |                    |               |       |
| Same day               | 30,000           | 5000 - 90,000 | 40,000             | 30,000-40,000 | 0.000 |
| After 1 day            | 90,000           | 3000 -160,000 | 40,000             | 7000 - 90,000 |       |
| After 2 days           | -                | -             | 50,000             | 6500- 170,000 |       |
| More than 5 days       | -                | -             | 20,000             | 5000 -160,000 |       |

\*Where p is based on Mann Whitney test result

#### **4.6 Objective 3: Determination of overall relative influencing factors of the cost in both the natural delivery and C-section for both public & private hospitals.**

The factors impacting the cost of both natural delivery and C-section have been analyzed by adopting linear regression for both the public and private hospitals and the results were tabulated in the table below.

#### 4.6.1 Determination of influencing factors of the cost of public hospital and private hospitals

$$Y = A_0 + A_1 X_1 + A_2 X_2 + \dots \dots A_n X_n$$

Y = Total cost (dependent variable)

X1 = Age (Independent variable)

X2 = Length of stay (Independent variable)

Table 4.18 shows the analysis of influencing factors of total cost on childbirth for both the private hospitals and public hospital. The results obtained indicate that there is significant difference between the various factors such as age and length of stay with the total cost in case of private hospitals data. The value  $p > F = 0.0465$  which is less than  $< 0.05$  and this showed that the combined variables of age and length of stay have a significant relationship with the total cost.  $P > |t|$  (Age) which is 0.318, is the p-value associated with the test statistic for age. The value is greater than 0.05 so there is no evidence we can say that age is statistically significant with total cost.  $P > |t|$  (length of stay) which is 0.030 so the value is less than 0.05 we can say that Length of stay is statistically significant with total cost.

The statistical results obtained for public hospital data indicate that there is significant difference between the various factors such as age and length of stay with the total cost. The value  $p > F = 0.0291$  which is less than 0.05. So, it showed that the combined variables of age and length of stay have a significant relationship with the total cost.  $P > |t|$  (Age) which is 0.709, is the p-value associated with the test statistic for age. This value is greater than 0.05 so there is no evidence we can say that age is statistically significant with total cost.  $P > |t|$  (length of stay) which is 0.009 so the value is less than 0.05 and we

can say that length of stay is statistically significant with total cost. As explained earlier, the results showed that the total cost is directly influenced by the increase of maternal age and length of stay. The same results were obtained from the study conducted in China (He et al., 2016).

**Table 4.18:** Impact factors of total cost (Private hospitals & Public Hospital)

|                | Private Hospitals |           |      |       |        | Public Hospital |           |       |       |        |
|----------------|-------------------|-----------|------|-------|--------|-----------------|-----------|-------|-------|--------|
| Total cost     | Coef.             | Std. Err. | T    | p> t  | p>F    | Coef.           | Std. Err. | T     | p> t  | p>F    |
| Age            | 1044.436          | 1034.702  | 1.01 | 0.318 | 0.0465 | -83.20          | 222.05    | -0.37 | 0.709 | 0.0291 |
| Length of stay | 9635.823          | 4301.102  | 2.24 | 0.030 |        | 1789.617        | 659.686   | 2.71  | 0.009 |        |

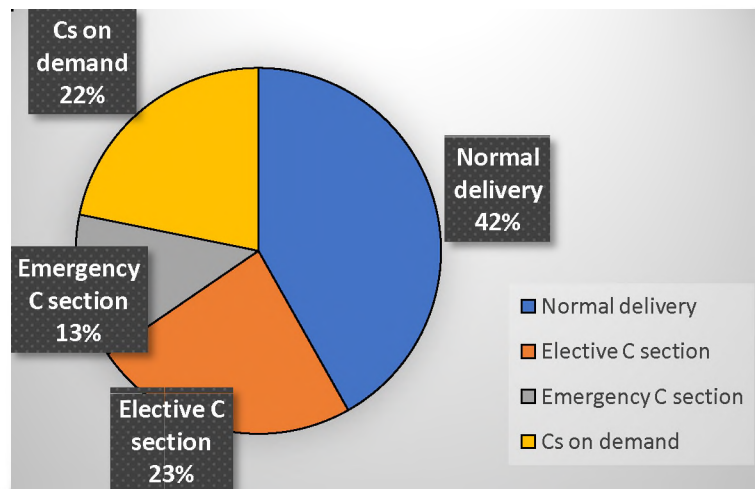


## CHAPTER 5

### DISCUSSION

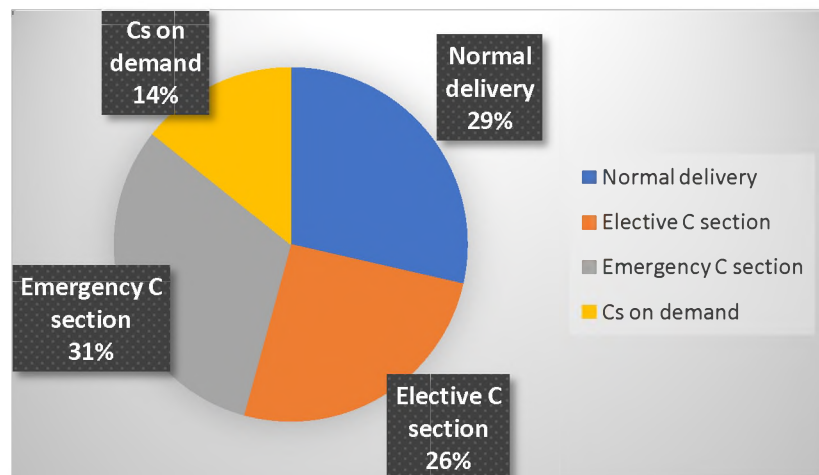
The aim of this study was to evaluate the overall scenario of maternity procedures (which includes natural delivery and C-section) in the public and private hospitals, understanding of these procedures by the general masses, understanding the indications leading to either of these procedures, the selection or the preference of these procedures by the women, the cost associated with them, its difference among the public and private hospitals and also the factors that impact the total cost of the child birth.

In this study the frequency of the natural delivery was 42% (23 out of 55) and the CS was 58% (32 out of 55) in the public hospital. The CS was further classified into elective CS with the frequency of 23% (13 out of 32), emergency CS with the frequency of 13% (7 out of 32) and CS on demand with the frequency of 22% (12 out of 32) as shown in figure 5.1



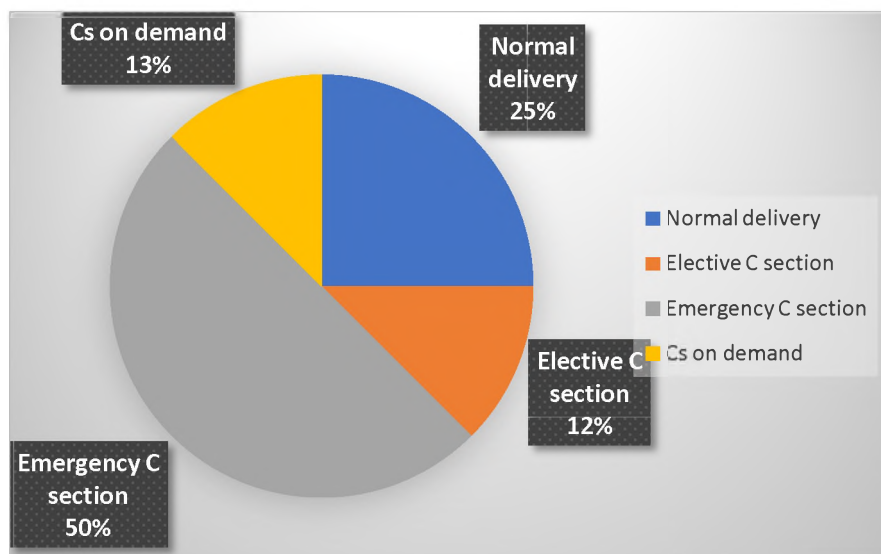
**Figure 5.1:** Frequency of normal delivery & CS in public hospital

Similarly, the frequency of natural delivery cases in the private hospital (a) was 29% (10 out of 35). The frequency of CS was 71.4% (25 out of 35) which was further classified into elective CS having a frequency of 26% (9 out of 35), emergency CS with the frequency of 31% (11 out of 35) and CS on demand with the frequency of 29% (5 out of 35) as shown in figure 5.2.



**Figure 5.2:** Frequency of normal delivery & CS in private hospital (a)

Likewise, in case of private hospital (b), the frequency of natural delivery cases was 25% (4 out of 16). The frequency of CS was 75% (12 out of 16) among which the frequency of elective CS was 16.66% (2 out of 12), the frequency of emergency CS was 66.66% (8 out of 12) and the frequency of CS on demand was 16.66% (2 out of 12) as shown in figure 5.3.



**Figure 5.3:** Frequency of normal delivery & CS in private hospital (b)

The combined frequency of normal cases for private hospitals (a +b) comes out to be 27% (14 out of 51) and the combined frequency of CS for private hospitals (a+b) comes out to be 73% (37 out of 51). The results of our study for the high CS rates (58% in public hospital and 73% in private hospitals) is consistent with other studies showing high frequency rates of CS (69.7%) conducted in Pakistan (Rasool et al., 2021). As well as, it has also been shown in the report of organization for economic corporation and developed countries (OECD) that there is increasing rates of CS in developed countries ranging from 14.9%(Israel) to 54% (Turkey) (Kurji, 2016).

Tables 4.1,4.2 &4.3 represents the descriptive analysis of the variables such as age, socio monthly income, Parity, birth interval, length of hospital stay and total cost on childbirth for the public hospital, private hospital (a) & private hospital (b). The main outcomes of the descriptive analysis consist that the mean maternal age range comes out to be 28-30 years. The descriptive analysis also showed that the participated women of the public hospital have secondary level of education, belonged to low-income families with mean

monthly income of 4805 Rs. mostly having second child with the mean birth interval range of about 3-3.5 years and a mean cost on childbirth around 5863 Rs. On the other hand, the women who preferred private hospitals (a & b) have a higher level of education with some having professional degrees, belonged to middle and upper middle class with mean monthly income of 67485 Rs. and 143215 Rs., mostly having their second and some having their first child and a mean cost on the childbirth around 46000 Rs and 117500 Rs. respectively. These results were also aligned with the results obtained in other studies where CS rates were found to be high along with the associating factors such as women with high maternal age (>24 years), high socioeconomic class, women with high education and professionally stable and preference of private facility (Amjad et al., 2018), (Parveen et al., 2017), (Mumtaz et al., 2017), (Begum et al., 2017), (Hopkins et al., 2014; Jisun & Kabir, 2014).

Different modes of delivery such as natural delivery and CS were described by adopting Chi-square test as shown in table 4.5 for the public hospital and the trend shows that the rates of natural delivery and CS significantly differs from the age group 15-19 years to 39-49 years with the p value of 0.02 ( $< 0.05$ ). It is evident from the table 4.5 that the rates of natural delivery were 8.69% & 69.56% higher than CS (3.12% & 37.5%) among the age group 15-19 years and 20-29 years. While, the rates of CS were 59.4% greater than the natural delivery rates (21.7%) among the age group 30-39 years. Which means higher the maternal age higher will be the chances of CS. The CS rates among high maternal age women can also be related to the fact that obstetric canal is not easy to expand and the uterus is weak thus higher age group women had to undergo CS. Similarly, the rates of CS and natural delivery rates significantly differs for the length of

stay at the hospital after the child birth ( $p= 0.000 < 0.05$ ). The rates of natural delivery patients discharged at the same day after childbirth were 86.95% compared to the C-section patients (0%). The rates of natural delivery patients discharged after 1 day were 13.04 % more than the CS (9.37%). However, the rates of CS patients discharged after 2 days were 53.12% greater than the natural delivery patients (0%).and similarly the rates of CS patients discharged after 5 days were 37.5% higher than the natural delivery patients (0%) of the same length of stay. In private hospital (a) the distribution of natural delivery and CS were significantly different for the length of stay at the hospital after the child birth ( $p= 0.000 < 0.05$ ) as shown in table 4.9. The rates of natural delivery patients discharged at the same day after childbirth were 90% compared to the C-section patients (0%). The rates of CS delivery patients discharged after 1 day were 16% higher than the natural delivery patients (10%). Similarly, the rates of CS patients discharged after 2 days were 72 % greater than the natural delivery patients (0%). Likewise, the rates of CS patients discharged after 5 days were 12% higher than the natural delivery patients (0%) for the same length of stay. Similarly, for private hospital (b) the rates of CS and natural delivery rates were significantly different for the length of stay at the hospital after the child birth ( $p= 0.04 < 0.05$ ) as shown in table 4.13. The rates of natural delivery patients discharged at the same day after childbirth were 25% compared to the C-section patients (0%). The rates of natural delivery patients discharged after 1 day were 75% higher than the CS patients (16.66%). On the contrary, the rates of CS patients discharged after 2 days were 75 % greater than the natural delivery patients (0%). Likewise, the rates of CS patients discharged after 5 days were 8.33% higher than the natural delivery patients (0%) for the same length of stay. This shows that the women who have undergone CS

procedure stays at the hospital for more days compared to the women who have undergone the natural delivery process. It can be explained by the fact that the CS patients stays more days in the hospital before discharge because they have undergone a surgical procedure that require close monitoring by the medical staff to avoid any health complications such as infections, to control and treat other pregnancy related complications such as high BP, or low HB or any blood requirement/transfusions.

The tables 4.6, 4.7 and 4.8 have discussed the frequency of indications for elective CS, emergency CS and CS on demand in the public hospital. The result from the table 4.6 revealed that frequency of abnormal/breached baby position (8, 61.53%) > previous CS (4, 30.76%) > overage/high BP/gestational diabetes (1, 7.69%) for elective CS. From table 4.7 it is concluded that the frequency of Prolonged Labor & Failed Induction (5, 71.42%) > high BP/gestational diabetes (1, 14.28%) & Chord around the neck of the baby (1, 14.28%) for emergency CS. While the table 4.8 indicated that the frequency of Previous C section & over age (8, 66.66%) > Due to psychological fear of normal delivery process (2, 16.66%) > Self decision: abnormal baby position (1, 8.33%) & Self decision: because of high BP throughout the pregnancy (1, 8.33%) for CS on demand. Likewise, the frequency of indications for different modes of CS for private hospital (a) has been studied in tables 4.10, 4.11 & 4.12. Table 4.10 shows that the frequency of indications for elective CS comes out to be abnormal/breached baby position (4, 44.44%) & previous CS (4, 44.44%) > overage/high BP/gestational diabetes (1, 11.11%). The table 4.11 revealed that the frequency of indications for emergency CS comes out to be Prolonged Labor & Failed Induction (3, 27.27%), high BP/gestational diabetes (3, 27.27%), & Fetal distress due to sudden decrease in the heart rate of the baby/ decreased

amniotic fluid /sudden bleeding at the time of delivery (3, 27.27%) > Chord around the neck of the baby (2, 18.18%). And the table 4.12 indicates that the frequency of indications for CS on demand comes out to be Previous C section & over age (4, 80 %) > Due to psychological fear of normal delivery process (1, 20%). In the same manner, the frequency of indications for different modes of CS has been studied in tables 4.14, 4.15 & 4.16 for private hospital (b). The table 4.14 showed that the frequency of indication for elective CS is as follows: abnormal/breached baby position (100%) > previous CS (0) & overage/high BP/gestational diabetes (0). Table 4.15 indicates that the frequency of indications for emergency CS is as follows: prolonged labor & failed induction (3, 37.5%) & Fetal distress due to sudden decrease in the heart rate of the baby/ decreased amniotic fluid /sudden bleeding at the time of delivery (3, 37.5%) > high BP/gestational diabetes (1, 12.5%) & Chord around the neck of the baby (1, 12.5%). And the frequency of indications for CS on demand as shown in table 4.16 is as follows: psychological fear of normal delivery process (1, 50%) & previous C-section & over age (1, 50 %) is higher than Self decision: abnormal baby position (0) & Self decision: because of high BP throughout the pregnancy (0). From these results it is evident that for elective CS the indication with higher frequency is abnormal /breached baby position. While, for emergency CS, the indication with higher frequency is Prolonged Labor & Failed Induction along with fetal distress and high BP/gestational diabetes. Whereas, for CS on demand the higher frequency indication comes out to be Previous C section & over age and psychological fear of normal delivery process. These results from the current study are consistent with the results obtained from other studies in which clinical indications associated with higher CS rates have been studied and showed that the most common

indications came out to be repeat CS, failure to progress, abnormal position of baby, fetal distress and fetal growth complications (Kanji et al., 2019),(Begum et al., 2017),(Jabeen, 2013),(G. Haider et al., 2009).

This has been a general conception that the cost associated with CS is much higher compared to the cost of natural delivery. Most of the studies performed in Pakistan have mainly discussed the incidence rates, clinical indications, regional comparison among the mode of delivery, however less is known about the cost or economic burden that the mode of delivery process. Therefore, one of the sole aspects that the current study has included which has made it novel from other studies, is the estimation of the total cost of CS and natural delivery, and its relation to the factors that may contribute to either increase or decrease of the total cost.

Table 4.17 showed that there is significant difference among the costs of natural delivery and CS. The results indicate that the maternal age and total cost have significant differences ( $p=0.00$ ). The cost of both the natural delivery & CS increases among the age groups from 15-19 years to 40-49 years. However, the cost of CS is higher than the cost of natural delivery among the age groups 15-19 years (42,500 Rs.), 20-29 years (50,000 Rs.) and 40-49 years (55,000 Rs.) except for the age group 30-39 years where the cost of natural delivery is higher than the cost of CS. Also, it can be taken into account that the total cost among the maternal age groups for the same mode of delivery such as natural delivery, it is evident that as the maternal age increases the total cost has also increased from 3000Rs. to 60,000 Rs. (for the maternal age groups 15-19 years to 30-39 years respectively). Same is the case for the CS, where the total cost increases from 42,000 Rs. to 55,000 Rs. for the maternal age groups 15-19 years to 40-49 years.



Table 4.17 also indicated from the results that length of stay and the total cost on child birth also show significant difference ( $p=0.000$ ) and it can be concluded that as the length of stay increases the total cost also increases. However, the cost of natural delivery for more than 1 day stay at hospital comes out to be Rs. 90,000 which is more if compared to the cost of C-section for the same no. of days that is Rs. 40,000. This might be because of the hospital type the patient has selected i.e., the patient has delivered in the private hospital where the cost automatically is higher compared to the public setting. The increase in cost with the increasing maternal age and increased length of hospital stay may be attributed to the facts that women with increased maternal age have moderate to severe complications and have difficulty in deliveries leading to increase rates of CS. Besides, women with CS have longer hospital stay which in turn require increased medical staffing and medical care resulting in the increased total cost. The current study results can be compared to the study that showed somewhat similar results conducted by He Z et al (2016) in which the researchers have studied the cost and their determinant of cesarean section and vaginal delivery in Chongqing Municipality, China. The study results showed that the rates of CS were 69%, 65.5% & 59.2% higher than vaginal delivery in the three sample tertiary hospitals. The cost and length of stay of CS were greater compared to vaginal delivery women ( $p<0.005$ ) and the factors like area, age, length of stay, medical insurance and modes of delivery were the influencing factors affecting the total cost for both CS and vaginal delivery (He et al., 2016).

Table 4.18 discussed the analysis of influencing factors of total cost on childbirth for the public hospital and private hospitals. The results from the tables revealed that there is significant difference between various factors such as age and length of stay with the total

cost for both public and private hospitals. For public hospital the value  $p > F = 0.0291$  ( $< 0.05$ ) indicated a significant relationship between the combined variables age and length of stay with the total cost. Similarly, for private hospitals, the value  $p > F = 0.0465$  ( $< 0.05$ ) showed that the combined variables of age and length of stay have a significant relationship with the total cost. As explained earlier, the results showed that the total cost is directly influenced by the increase of maternal age and length of stay. The same results were obtained from the study conducted in China (He et al., 2016).

## **CHAPTER 6**

### **CONCLUSION AND POLICY RECOMMENDATION**

#### **6.1 INTRODUCTION**

This chapter entails of two parts. The first part addresses the conclusion of the study based on the findings and results. While the second part consists of policy recommendation based on the empirical results.

#### **6.2 CONCLUSION**

In this study, we comprehended that CS rates were high than natural delivery in both public and private hospitals, the high CS rates were associated with increasing maternal age from 15-19 to 30-39 years. In addition, the cost of CS was higher than the cost of natural delivery among the age groups 15-19 years, 20-29 years and 40-49 years. Furthermore, it also has been perceived that the total cost on childbirth also increases with the length of the stay. The major factors significantly impacting the total cost comes out to be age and length of stay. Besides, the high frequency indications for the CS (elective CS, emergency CS & CS on demand) were abnormal /breached baby position, prolonged labor, failed Induction, fetal distress, high BP/gestational diabetes, previous C-section, over age and psychological fear of normal delivery process. Therefore, it can be concluded that an upsurge in the overall CS rates have been identified along with high total cost of CS as compared to natural delivery. Besides this the cost variance can also be seen among the private and public settings. These matters needs to be controlled by

implementation of strict departmental guidelines, design & development of comprehensive policies and design & implementation of community-based programs to improve awareness regarding the maternal care and needs. In addition, the ongoing national family planning programs and chief care programs must be modified according to the desires of modern day requirements to curb the increasing malpractice leading to higher frequency of CS.

### **6.3 POLICY RECOMMENDATIONS**

From the current study it has been concluded that at present the increased CS rates and the related medical costs needs to be given attention by the policy makers. The dilemma of our country's medical setup is that there is no explicit CS policy in any hospital be it public or private. Therefore, it is high time that the policy makers take notice of this important issue and take necessary steps towards the proposal and implementation of a recommendable policy related to the CS procedure in public & private medical institutions. . An impressive public health care system framework depends on: country's perspective of healthcare i.e. either an individual as the unit of concern or the overall system as unit of concern, prioritization of healthcare services, health budget and community based local healthcare services delivery. In spite of having intensive network of health facilities and strong district administrative system, Pakistan in its 72 years is not being able to build a strong healthcare system. The main reasons concluded for this failure includes that the focus is on the individual care rather than on the larger healthcare system addressing the health issues of the large population. And the other reason being is its lack of ability to build local health care services.

Based on the observations and research results, a few suggestions that can be made are, targeted education intervention programs should be held at community levels. The main purpose of these programs must be providing support and education to the general population regarding maternal care and address the myths and misconceptions about normal delivery. This might be helpful in broadening the thinking process as well as the decision taking ability of women and their families to avoid unnecessary C-section deliveries. Another step that can be fruitful to control the increasing rates of C-section delivery and the associated burden of cost on the families is that strict departmental policies must be invented by the institutions based on their personal requirements by addressing the ways of controlling medical costs, shortening the average length of stay and increasing the bed turnover alongside maintaining the medical quality. On the contrary, it is also the responsibility of the individual persons to take into account necessary changes/interventions that needs to be made so as to avoid unnecessary surgical procedures such as pregnant women must pay attention to healthy diet plans and performs exercise to extend the rates of normal delivery. Such events must be made part of the interventions or programs to improve the quality and way of living. There should be a national policy on reproductive health work which focus mainly on CS and other methods of delivery.

In addition to all these, the current CS rate can be brought in line with the recommendations of WHO guidelines which is a standardized organization followed by the globe. The guidelines can be adopted from WHO's 2018 report which stated the non-clinical interventions that can be utilized to reduce unnecessary CS via a collaborative midwifery- obstetrician model of care. These guidelines comprised a list of

recommendations based on non-clinical interventions to reduce cesarean section rates which includes (WHO, 2018). These guidelines can be adopted as such or can be amended according to the national needs.

1. Interventions targeted at women via childbirth training workshops, Nurse -led applied relaxation training program, psychological couple-based prevention program and psycho education. The main target of all these programs is to provide health education to women.

2. Interventions targeted at health-care professionals: This recommends implementation of evidence-based clinical practice guidelines via mandatory second opinion for CS, CS audits and timely feedback to health care professionals.

3. Interventions targeted at health organizations, facilities or systems: this recommends the use of collaborative midwifery-obstetrician model of care for the sole purpose of reducing the CS rates. Such model involves staffing based on care provided primarily by the midwives and a 24 hrs back up from an obstetrician who provides in house labor and delivery coverage.

#### **6.4 LIMITATIONS OF THE STUDY**

In view of limitations of the study, we have just limited the investigations on the data on three hospitals (one public and two private hospitals). This is because hospital management were reluctant in participating in the study or giving access to their patients for collection of the data. So only the hospitals who have allowed data collection were included. The sample data taken from these hospitals were limited because of the limited patient turnover during the study period. Also because of the time constraint, more time

was not utilized to get more data or include other hospitals. Also, it can be believed that due to limited data the results cannot be generalized to whole population. The data was taken from patient perspective and not from the hospital aspect. Therefore, in future, the study can be extended to include other perspectives such as hospital, and medical care provider to investigate more aspects of the topic. By increasing the sample size, in terms of including more hospitals and patients from within the area of Islamabad the study can be a good representation of the population of the respected area. Also, for future studies this topic can be extended to whole of the Pakistan by including all the major cities/provinces, to get apt results and findings which can then be generalized to whole of the population. Furthermore, as data sharing by the hospital was a major problem, therefore it should be regulated under R&D rules for the benefit of MS Scholars. So as the students could be able conduct quality research that would in turn be helpful to support policy makers and planners.

## REFERENCES

- Abbas, F., Amir ud Din, R., & Sadiq, M. (2018). Prevalence and determinants of Caesarean delivery in Punjab, Pakistan. *Eastern Mediterranean Health Journal*, 24(11).
- Abbas, S. A., Riaz, R., Kazmi, S. Z. H., Rizvi, S. S., & Kwon, S. J. (2018). Cause analysis of caesarian sections and application of machine learning methods for classification of birth data. *IEEE Access*, 6, 67555-67561.
- Abdallah, W., Abi Tayeh, G., Cortbaoui, E., Nassar, M., Yaghi, N., Abdelkhalek, Y., . . . Attieh, E. (2022). Cesarean section rates in a tertiary referral hospital in Beirut from 2018 to 2020: Our experience using the Robson Classification. *International Journal of Gynecology & Obstetrics*, 156(2), 298-303.
- Acharya, J., Kaehler, N., Marahatta, S. B., Mishra, S. R., Subedi, S., & Adhikari, B. (2016). Hidden costs of hospital based delivery from two tertiary hospitals in Western Nepal. *PloS one*, 11(6), e0157746.
- Agha, S., & Carton, T. W. (2011). Determinants of institutional delivery in rural Jhang, Pakistan. *International journal for equity in health*, 10(1), 1-12.
- Agha, S., & Williams, E. (2016). Quality of antenatal care and household wealth as determinants of institutional delivery in Pakistan: Results of a cross-sectional household survey. *Reproductive Health*, 13(1), 1-8.
- Ali, Y., Khan, M. W., Mumtaz, U., Salman, A., Muhammad, N., & Sabir, M. (2018). Identification of factors influencing the rise of cesarean sections rates in Pakistan, using MCDM. *International Journal of Health Care Quality Assurance*.
- Amjad, A., Amjad, U., Zakar, R., Usman, A., Zakar, M. Z., & Fischer, F. (2018). Factors associated with caesarean deliveries among child-bearing women in Pakistan: secondary analysis of data from the demographic and health survey, 2012–13. *BMC pregnancy and childbirth*, 18(1), 1-9.
- Amjad, A., Imran, A., Shahram, N., Zakar, R., Usman, A., Zakar, M. Z., & Fischer, F. (2020). Trends of caesarean section deliveries in Pakistan: secondary data analysis from Demographic and Health Surveys, 1990–2018. *BMC pregnancy and childbirth*, 20(1), 1-13.
- Begum, T., Rahman, A., Nababan, H., Hoque, D. M. E., Khan, A. F., Ali, T., & Anwar, I. (2017). Indications and determinants of caesarean section delivery: evidence from a population-based study in Matlab, Bangladesh. *PloS one*, 12(11), e0188074.
- Belizán, J. M., Althabe, F., & Cafferata, M. L. (2007). Health consequences of the increasing caesarean section rates. *Epidemiology*, 18(4), 485-486.
- Betrán, A. P., Merialdi, M., Lauer, J. A., Bing-Shun, W., Thomas, J., Van Look, P., & Wagner, M. (2007). Rates of caesarean section: analysis of global, regional and national estimates. *Paediatric and perinatal epidemiology*, 21(2), 98-113.
- Betrán, A. P., Ye, J., Moller, A.-B., Zhang, J., Gülmezoglu, A. M., & Torloni, M. R. (2016). The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. *PloS one*, 11(2), e0148343.
- Borghí, J., Bastus, S., Belizan, M., Carroli, G., Hutton, G., & Fox-Rushby, J. (2003). Costs of publicly provided maternity services in Rosario, Argentina. *Salud publica de Mexico*, 45, 27-34.



- Demographic, P. Health Survey 2017-18. Islamabad: The DHS Program ICF Rockville, Maryland, USA; 2019 [cited 16 June 2020]. In.
- Festin, M. R., Laopaiboon, M., Pattanittum, P., Ewens, M. R., Henderson-Smart, D. J., & Crowther, C. A. (2009). Caesarean section in four South East Asian countries: reasons for, rates, associated care practices and health outcomes. *BMC pregnancy and childbirth*, *9*(1), 1-11.
- Gibbons, L., Belizán, J. M., Lauer, J. A., Betrán, A. P., Merialdi, M., & Althabe, F. (2010). The global numbers and costs of additionally needed and unnecessary caesarean sections performed per year: overuse as a barrier to universal coverage. *World health report*, *30*(1), 1-31.
- Glen, S. "Mann Whitney U Test: Definition, How to Run". Retrieved from <https://www.statisticshowto.com/mann-whitney-u-test/>
- Glen, S. (2020). Chi-square statistic: How to calculate it/distribution. *From StatisticsHowTo. com: Elementary Statistics for the rest of us*.
- Green, A., Ali, B., Naeem, A., & Vassall, A. (2001). Using costing as a district planning and management tool in Balochistan, Pakistan. *Health policy and planning*, *16*(2), 180-186.
- Grytten, J., Monkerud, L., Hagen, T. P., Sørensen, R., Eskild, A., & Skau, I. (2011). The impact of hospital revenue on the increase in Caesarean sections in Norway. A panel data analysis of hospitals 1976-2005. *BMC Health Services Research*, *11*(1), 1-10.
- Haider, G., Zehra, N., Munir, A. A., & Haider, A. (2009). Frequency and indications of cesarean section in a tertiary care hospital. *Pak J Med Sci*, *25*(5), 791-796.
- Haider, M. R., Rahman, M. M., Moinuddin, M., Rahman, A. E., Ahmed, S., & Khan, M. M. (2018). Ever-increasing Caesarean section and its economic burden in Bangladesh. *PloS one*, *13*(12), e0208623.
- He, Z., Cheng, Z., Wu, T., Zhou, Y., Chen, J., Fu, Q., & Feng, Z. (2016). The costs and their determinant of cesarean section and vaginal delivery: an exploratory study in Chongqing Municipality, China. *BioMed research international*, *2016*.
- Hopkins, K., de Lima Amaral, E. F., & Mourão, A. N. M. (2014). The impact of payment source and hospital type on rising cesarean section rates in Brazil, 1998 to 2008. *Birth*, *41*(2), 169-177.
- Idris, S., Gwarzo, U., & Shehu, A. (2006). Determinants of place of delivery among women in a semi-urban settlement in Zaria, northern Nigeria. *Annals of African medicine*, *5*(2), 68-72.
- Ismail, S. (2022). Caesarean section delivery in private and public facilities in Tunisia.
- Jabeen, J. (2013). Analysis of indications of caesarean sections. *Journal of Rawalpindi Medical College*, *17*(1), 101-103.
- Jisun, T. F., & Kabir, M. R. (2014). A comparative study on the preference for delivery process in Bangladesh. *ABC Journal of Advanced Research*, *3*(1), 24-28.
- Kanji, Z., Simonovich, S. D., Najmi, N., & Bishop-Royse, J. (2019). Examining clinical indications for cesarean section in a university hospital in Karachi, Pakistan. *Journal of Asian Midwives (JAM)*, *6*(1), 14-25.
- Khan, A., & Zaman, S. (2010). Costs of vaginal delivery and Caesarean section at a tertiary level public hospital in Islamabad, Pakistan. *BMC pregnancy and childbirth*, *10*(1), 1-8.

- Khawaja, M., Kabakian-Khasholian, T., & Jurdi, R. (2004). Determinants of caesarean section in Egypt: evidence from the demographic and health survey. *Health policy*, 69(3), 273-281.
- Kurji, Z. P., Z.S.; Mithani, Y. (2016). Analysis Of The Health Care System Of Pakistan: Lessons Learnt And Way Forward. 28(3):601-604. Retrieved from <https://pubmed.ncbi.nlm.nih.gov/28712245/>
- Lumbiganon, P., Laopaiboon, M., Gülmezoglu, A. M., Souza, J. P., Taneepanichskul, S., Ruyan, P., . . . Hinh, N. D. (2010). Method of delivery and pregnancy outcomes in Asia: the WHO global survey on maternal and perinatal health 2007–08. *The Lancet*, 375(9713), 490-499.
- Meng, Z., Zou, K., Ding, N., Zhu, M., Cai, Y., & Wu, H. (2019). Cesarean delivery rates, costs and readmission of childbirth in the new cooperative medical scheme after implementation of an episode-based bundled payment (EBP) policy. *BMC public health*, 19(1), 1-10.
- Mrisho, M., Schellenberg, J. A., Mushi, A. K., Obrist, B., Mshinda, H., Tanner, M., & Schellenberg, D. (2007). Factors affecting home delivery in rural Tanzania. *Tropical medicine & international health*, 12(7), 862-872.
- Mumtaz, S., Bahk, J., & Khang, Y.-H. (2017). Rising trends and inequalities in cesarean section rates in Pakistan: Evidence from Pakistan Demographic and Health Surveys, 1990-2013. *PloS one*, 12(10), e0186563.
- Neuman, M., Alcock, G., Azad, K., Kuddus, A., Osrin, D., More, N. S., . . . Saville, N. (2014). Prevalence and determinants of caesarean section in private and public health facilities in underserved South Asian communities: cross-sectional analysis of data from Bangladesh, India and Nepal. *BMJ open*, 4(12), e005982.
- Norum, J., & Svee, T. E. (2018). Caesarean section rates and activity-based funding in Northern Norway: a model-based study using the World Health Organization's recommendation. *Obstetrics and Gynecology International*, 2018.
- Nugus, S. (2009). *Financial planning using Excel: forecasting, planning and budgeting techniques*: Butterworth-Heinemann.
- Organization, W. H. (1994). *Indicators to monitor maternal health goals: Report of a technical working group, Geneva, 8-12 November 1993*. Retrieved from
- Organization, W. H. (2015). *Trends in maternal mortality: 1990-2015: estimates from WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division*: World Health Organization.
- Parveen, Z., Sadiq, M., Abbas, F., & Amir-ud-Din, R. (2017). Correlates of home and hospital delivery in Pakistan. *J Pak Med Assoc*, 67(8), 1166-1172.
- Potter, J. E., Berquó, E., Perpétuo, I. H., Leal, O. F., Hopkins, K., Souza, M. R., & de Carvalho Formiga, M. C. (2001). Unwanted caesarean sections among public and private patients in Brazil: prospective study. *Bmj*, 323(7322), 1155-1158.
- Publishing, O., Cooperation, O. f. E., & Staff, D. (2013). *Health at a glance 2013: OECD indicators*: OECD publishing.
- Rasool, M. F., Akhtar, S., Hussain, I., Majeed, A., Imran, I., Saeed, H., . . . Ashraf, W. (2021). A cross-sectional study to assess the frequency and risk factors associated with cesarean section in Southern Punjab, Pakistan. *International Journal of Environmental Research and Public Health*, 18(16), 8812.

- Seljeskog, L., Sundby, J., & Chimango, J. (2006). Factors influencing women's choice of place of delivery in rural Malawi-an explorative study. *African journal of reproductive health*, 10(3), 66-75.
- Souza, J., Betran, A., Dumont, A., De Mucio, B., Gibbs Pickens, C., Deneux- Tharaux, C., . . . Togoobaatar, G. (2016). A global reference for caesarean section rates (C- Model): a multicountry cross- sectional study. *BJOG: An International Journal of Obstetrics & Gynaecology*, 123(3), 427-436.
- Studies, N. I. o. P., Demographic, M. I. I. f. R. D., & Surveys, H. (2012). *Pakistan demographic and health survey*: National Institute of Population Studies.
- Tang, S., Li, X., & Wu, Z. (2006). Rising cesarean delivery rate in primiparous women in urban China: evidence from three nationwide household health surveys. *American journal of obstetrics and gynecology*, 195(6), 1527-1532.
- Tey, N.-P., & Lai, S.-I. (2013). Correlates of and barriers to the utilization of health services for delivery in South Asia and Sub-Saharan Africa. *The Scientific World Journal*, 2013.
- Villar, J., Valladares, E., Wojdyla, D., Zavaleta, N., Carroli, G., Velazco, A., . . . Faundes, A. (2006). Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. *The Lancet*, 367(9525), 1819-1829.
- WHO. (2015). Caesarean sections should only be performed when medically necessary. Retrieved from <https://www.who.int/news/item/09-04-2015-caesarean-sections-should-only-be-performed-when-medically-necessary-says-who#:~:text=Caesarean%20sections%20should%20only%20be%20performed%20when%20medically%20necessary%20says%20WHO,-9%20April%202015&text=Since%201985%2C%20the%20international%20healthcare,be%20between%2010%2D15%25>.
- WHO. (2018). WHO recommendations non-clinical interventions to reduce unnecessary caesarean sections. Geneva. Retrieved from <https://apps.who.int/iris/bitstream/handle/10665/275377/9789241550338-eng.pdf?ua=1>
- WHO, U., & Unicef. (2009). AMDD. *Monitoring emergency obstetric care: a handbook*. Geneva: WHO, 152.
- Yassin, K., & Saida, G. (2012). Levels and determinants of caesarean deliveries in Egypt: pathways to rationalization. *The Internet Journal of World Health and Societal Politics*, 7(2), 1-13.

# ANNEXURE I: QUESTIONNAIRE

## QUESTIONNAIRE

Name of Respondents: \_\_\_\_\_

1. What is your age?
  - a) 15 to 19
  - b) 20 to 29
  - c) 30 to 39
  - d) 40 to 49
  
2. In which area/city are you currently residing? If other, please mention the area name.
  - a) Within Islamabad
  - b) Rawalpindi
  - c) Other \_\_\_\_\_
  
3. What is the highest level of degree or level of education you have completed?
  - a) No formal education
  - b) Primary
  - c) Secondary
  - d) MA/MSC
  - e) Professional degree \_\_\_\_\_
  
4. Are you currently employed?
  - a) Yes
  - b) No
  
5. What is your total monthly Expenditure (approximately)?
  - a) Less than 25000
  - b) 25000 - 40000

- c) 40000 - 65000
- d) 65000 – 85000
- e) 85000 – 100,000
- f) More then 150,000

6. What type of hospital facility do you prefer to give Birth?

- a) Public
- b) Private

7. Parity?

- a) First
- b) Second
- c) Third
- d) Fourth

8. Where have you delivered previously?

- a) Public
- b) Private
- c) Not applied

9. Where have your recent delivery happened? In case of change of facility from the previous delivery give reason.

- a) Public
- b) Private
- c) Reason for the change of facility\_\_\_\_\_

---

10. Previous mode of delivery?

- a) Normal delivery
- b) Elective C section
- c) Emergency C section
- d) CS on demand
- e) Not applied

**11. What mode of delivery have you undergone to give birth recently?**

- a) Normal delivery
- b) Elective C section
- c) Emergency C section
- d) CS on demand

**12. Indications for Elective C-section?**

- a) Abnormal/ breached baby position
- b) Previous C section
- c) Overage, High B.P, Gestational diabetes
- d) None

**13. Indication for emergency C-section?**

- a) High B.P & gestational diabetes
- b) Prolonged Labor & Failed Induction
- c) Chord around the neck of the baby
- d) Foetal distress due to sudden decrease in the heart rate of the baby  
decreased amniotic fluid or sudden bleeding at the time of delivery
- e) None

**14. What are the reasons for C-section on demand?**

- a) Self decision: abnormal baby position
- b) Due to psychological fear of normal delivery process
- c) Self decision: of high BP throughout the pregnancy
- d) Previous C section & over age
- e) None

**15. Do you face any complications during the recent pregnancy?**

- a) Yes
- b) No

**16. What complications do you encounter during the pregnancy?**

- a) Low HB/ Low BP/  
Weakness
- b) Generalized Body

- aches
- c) Severe Nausea & vomiting
- d) High BP & Gestational Diabetes
- e) None

**17. Were all your children born alive?**

- a) Yes
- b) No

**18. Gap between previous and current pregnancy?**

- a) 1 - 2.5 years
- b) 3 - 4.5 years
- c) 5 - 6.5 years
- d) 7 - 8.5 years
- e) None

**19. For how many days you have to stay in the hospital after the delivery?**

- a) Discharged the same day
- b) After 1 day
- c) After 2 days
- d) More than 5 days

**20. How much was the total cost on the child Birth?**

- a) < 30,000
- b) 30,000 to 49,000
- c) 50,000 to 1lack
- d) More than 1.5 lack
- e) None

**21. Please mention the major expenses that is included in the Cost?**

- a) Dr's Fee/Hospital Fee
- b) Medicines / surgical items / blood bags/ ward/room charges
- c) Lab share / OT share
- d) Doctor's share/ Medicines / surgical items / blood bags/ ward/room charges
- e) Medicines / surgical items / blood bags/ ward/room charges & Lab share / OT share
- f) All of the above

**g) None**

**22. Are you satisfied with the Facilities provided by the hospital during the treatment?**

**a) Yes**

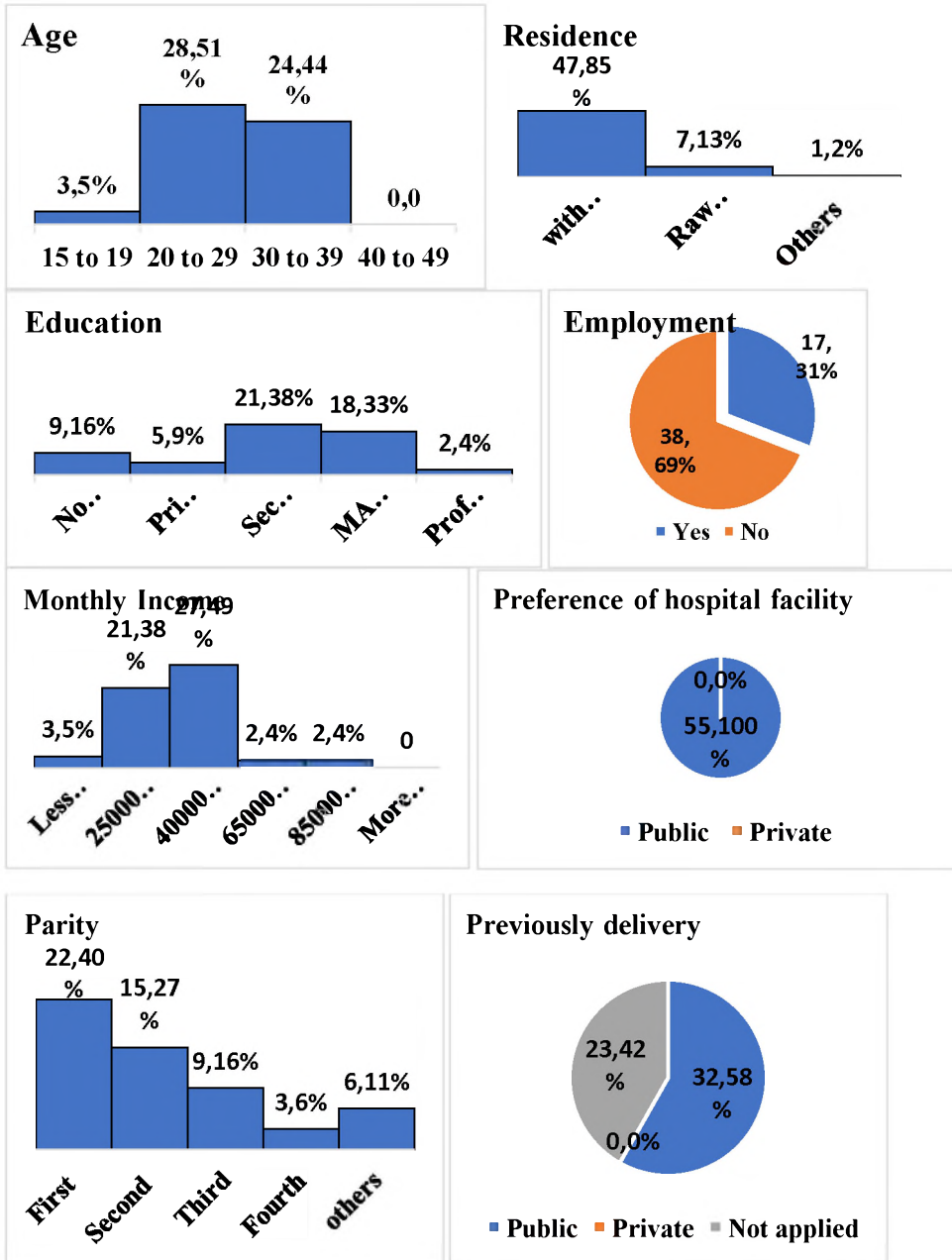
**b) No**

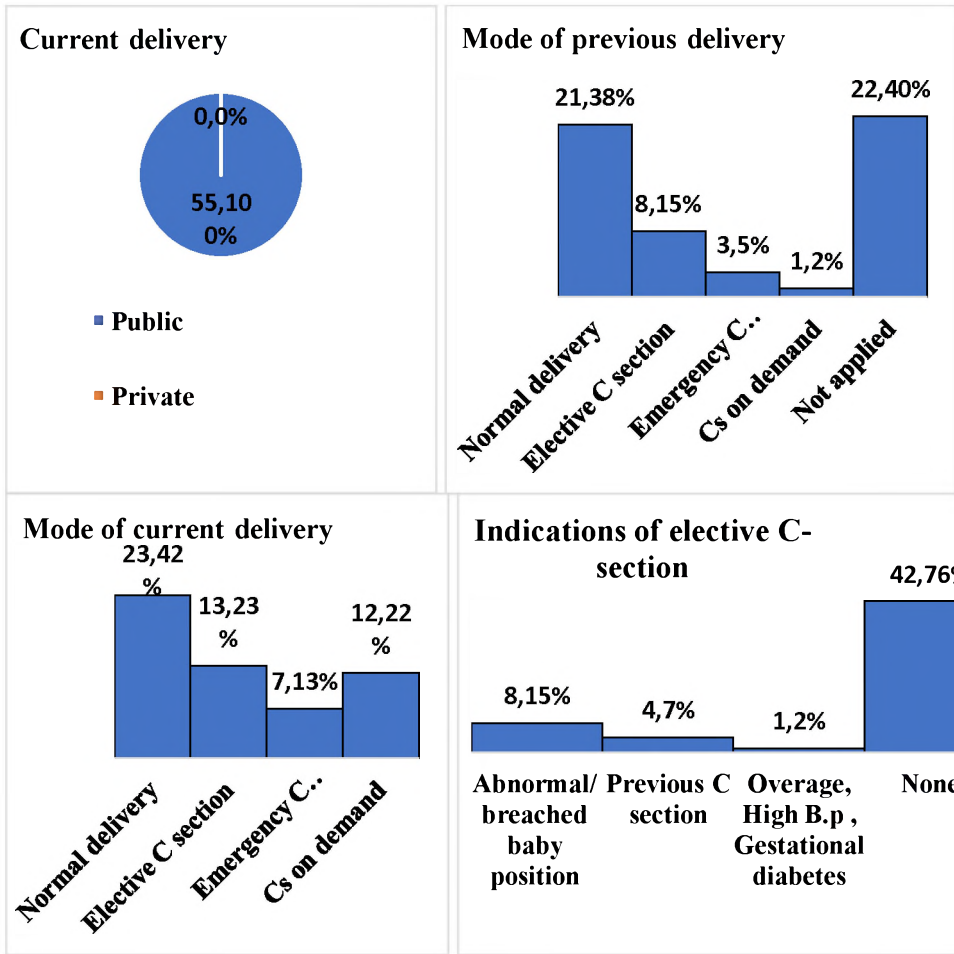
**c) Partially Satisfied**



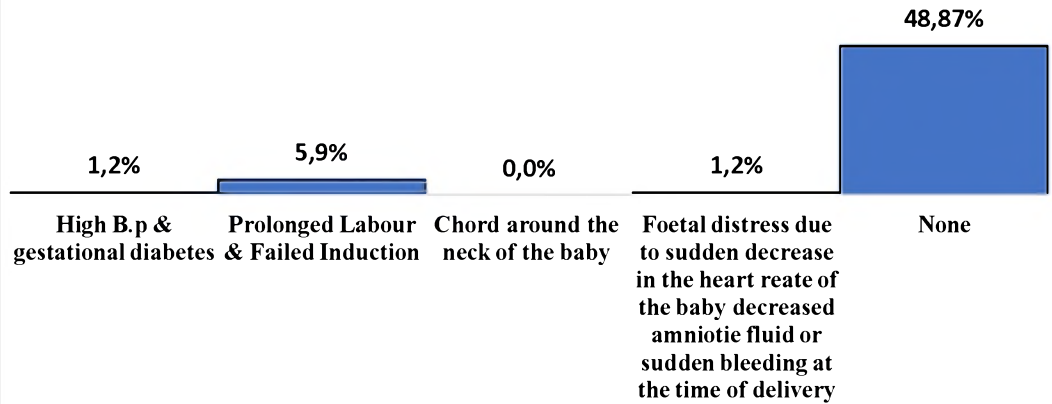
# ANNEXURE II: Graphical Representations

## Public hospital

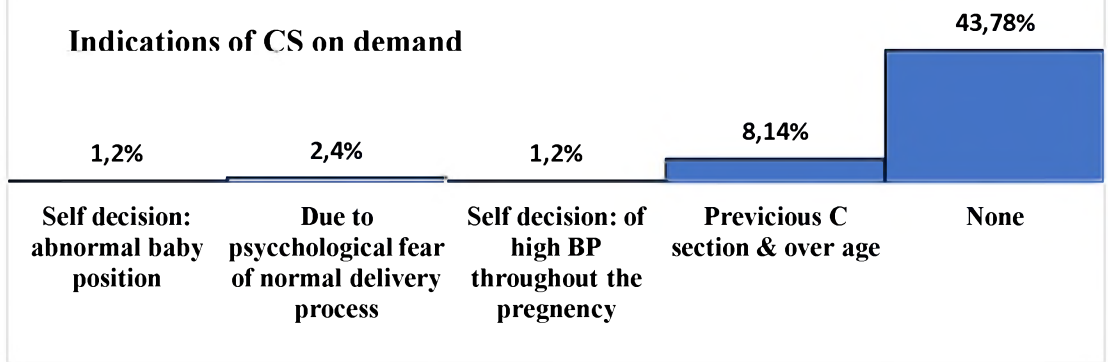




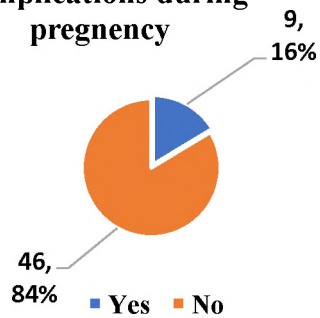
### Indications of emergency C-section



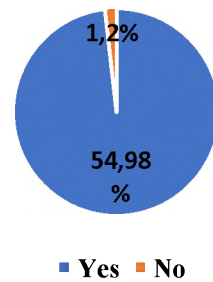
### Indications of CS on demand

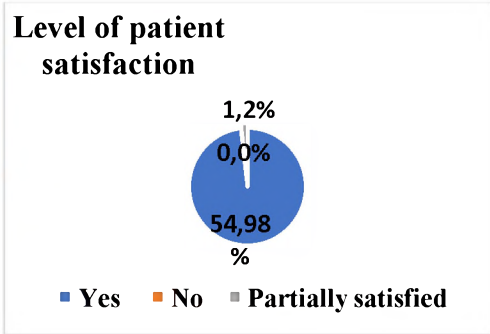
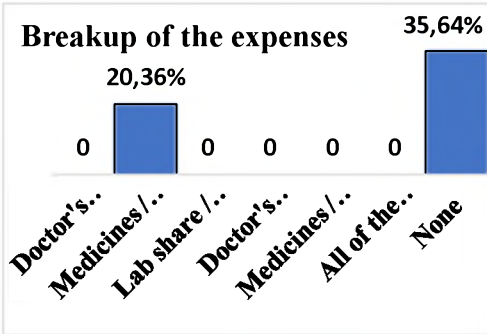
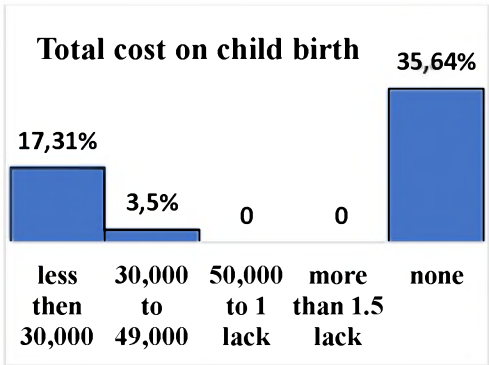
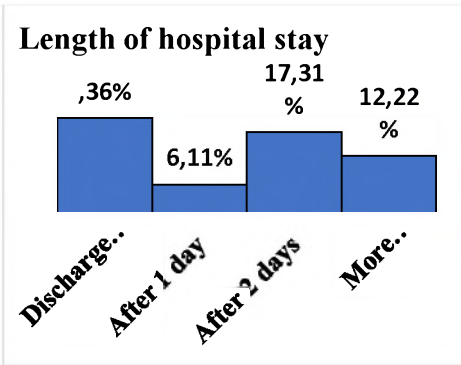
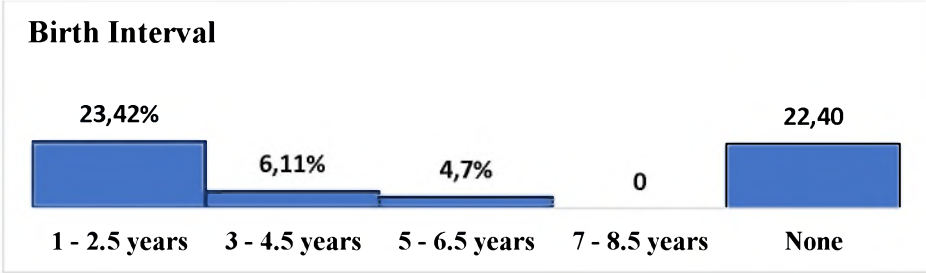
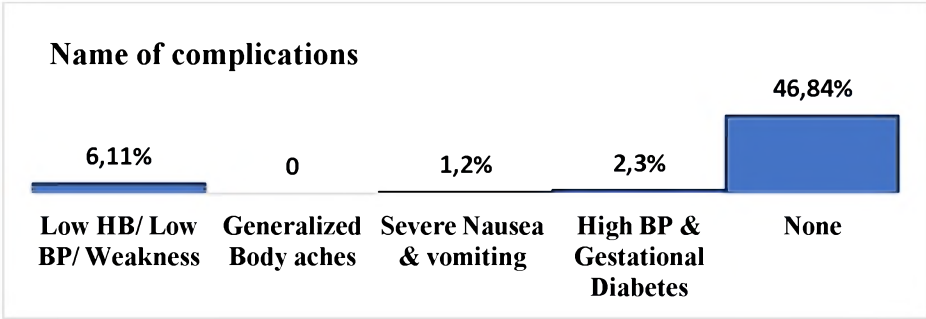


### Complications during pregnancy

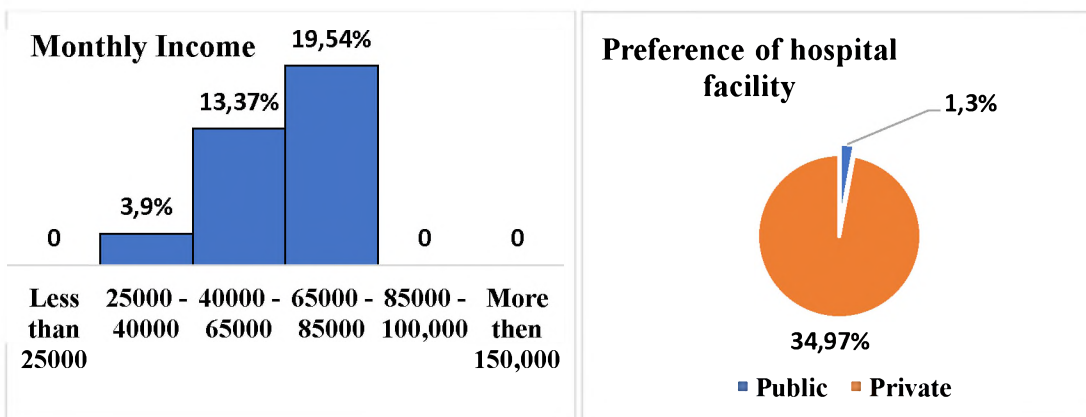
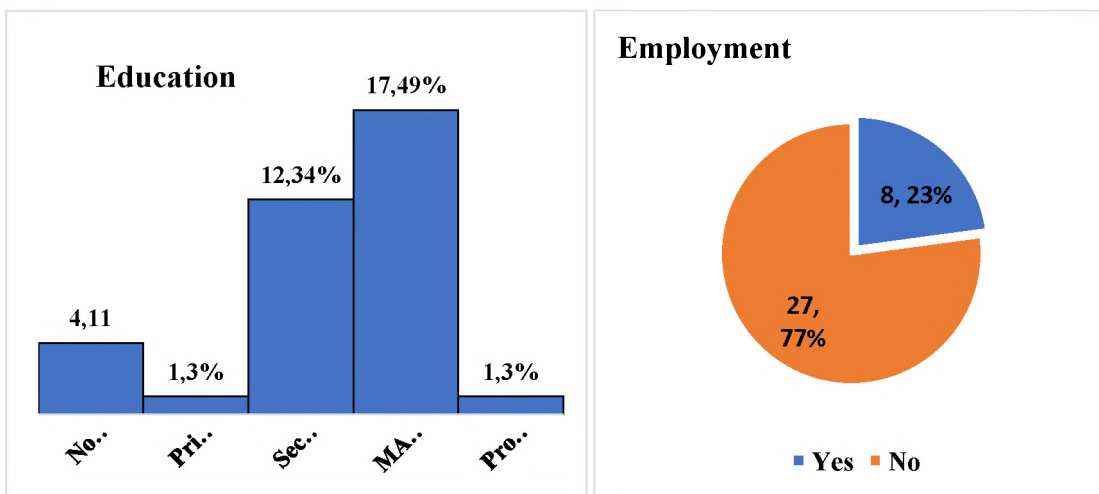
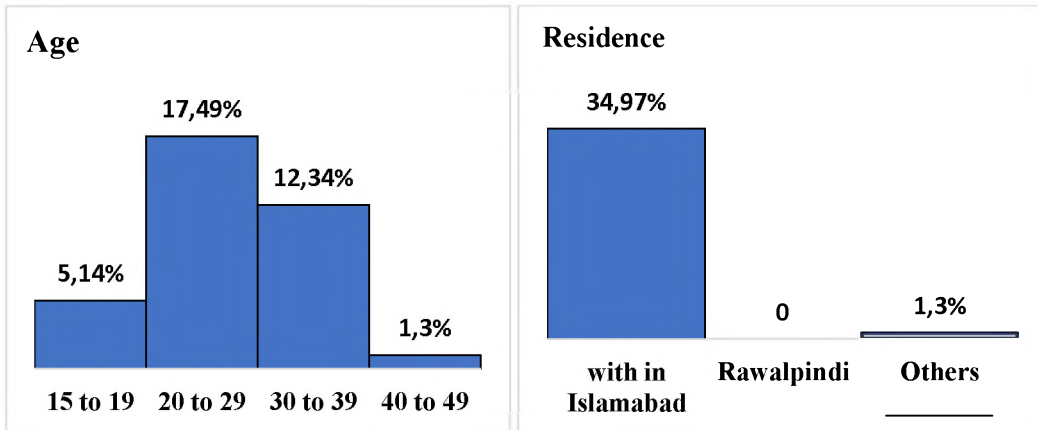


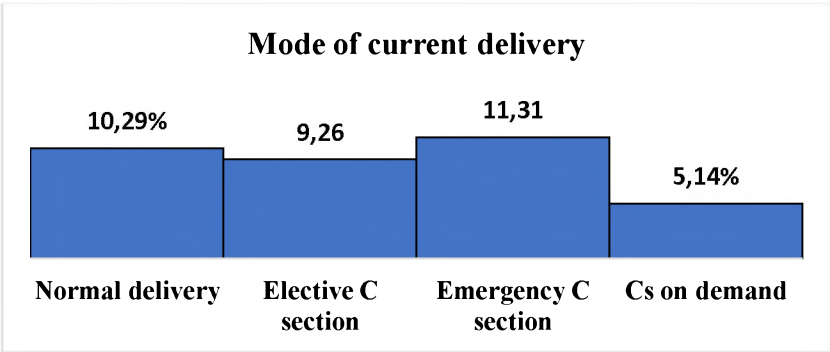
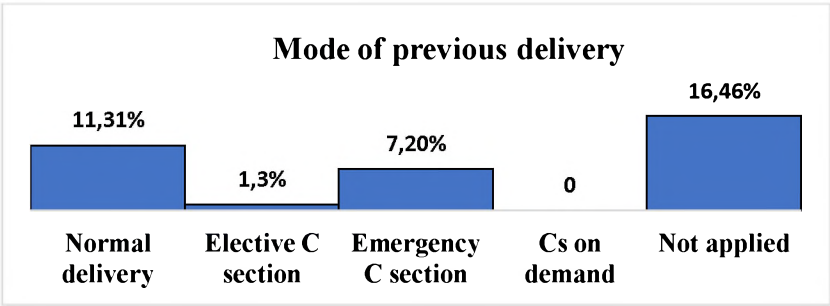
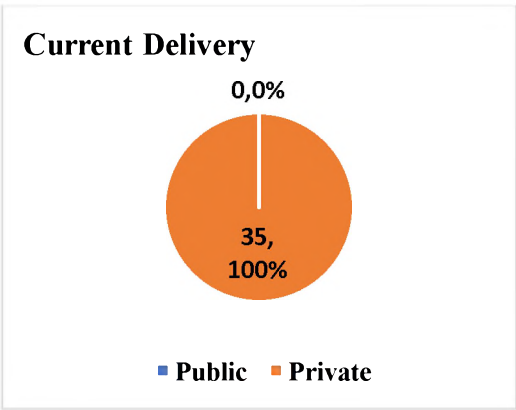
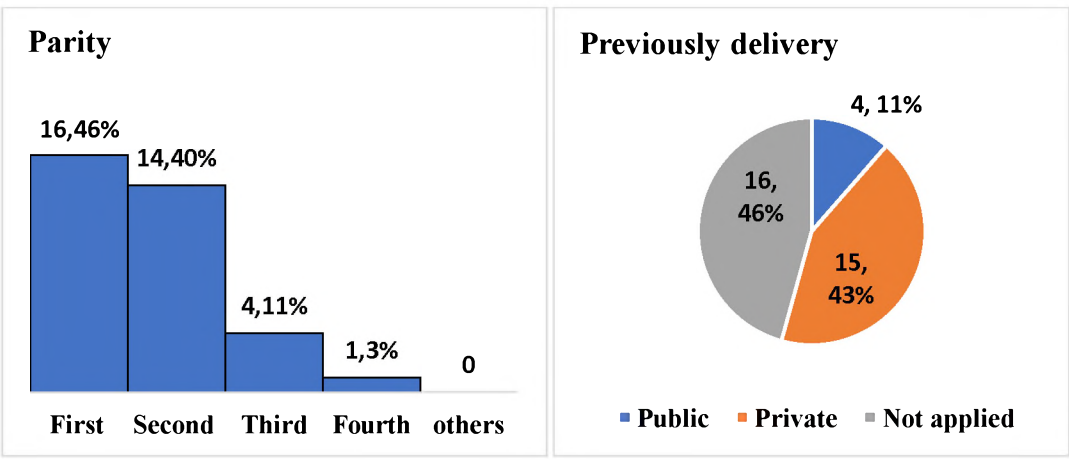
### No. of live Issues/ Siblings

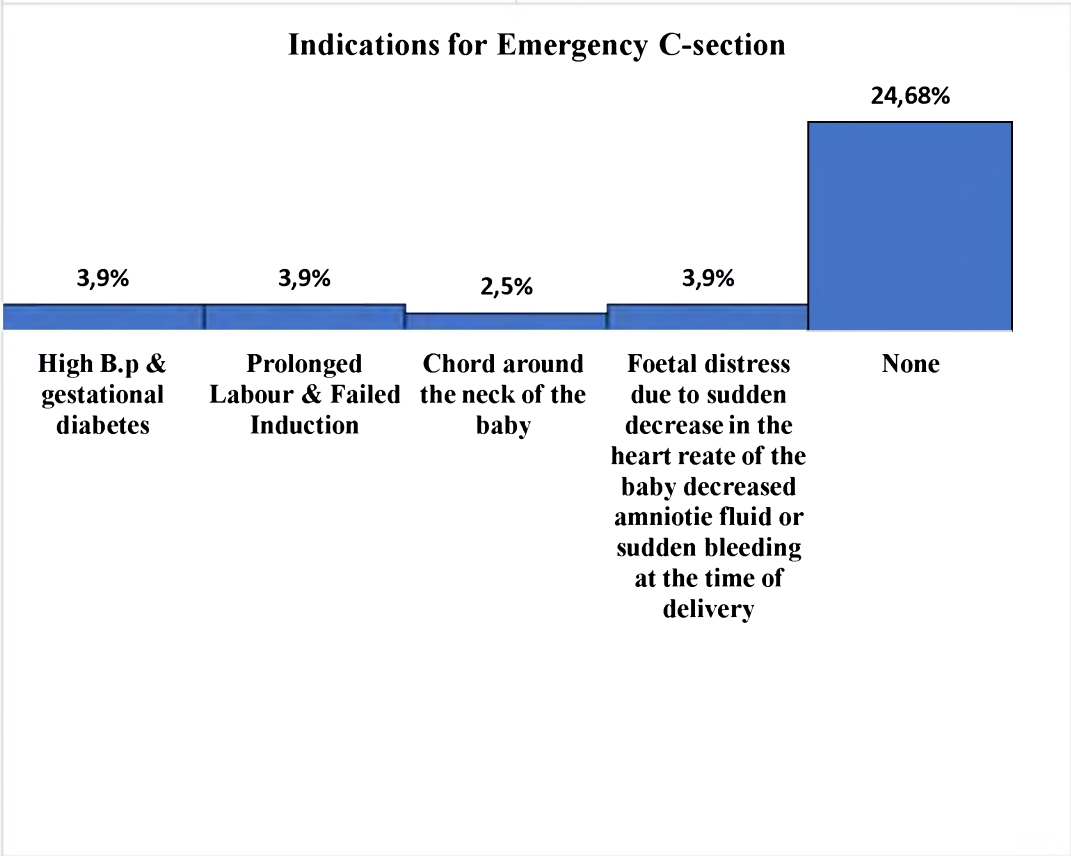
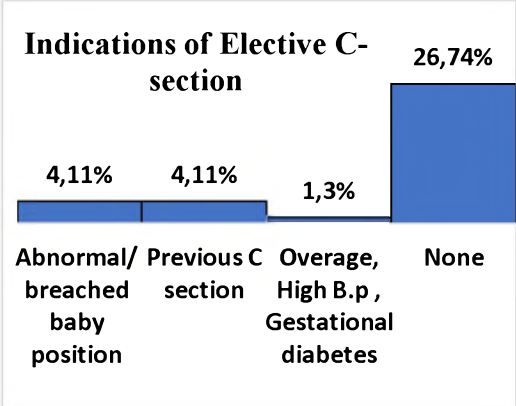


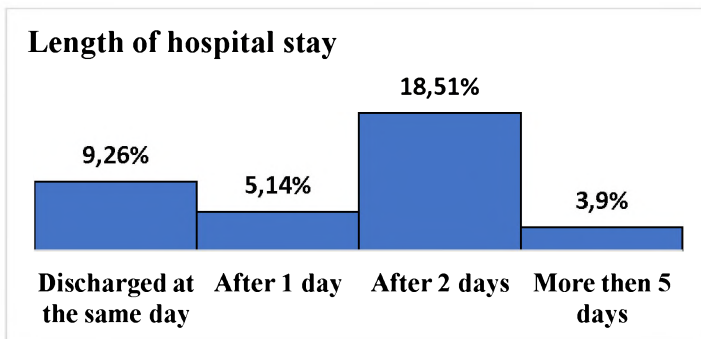
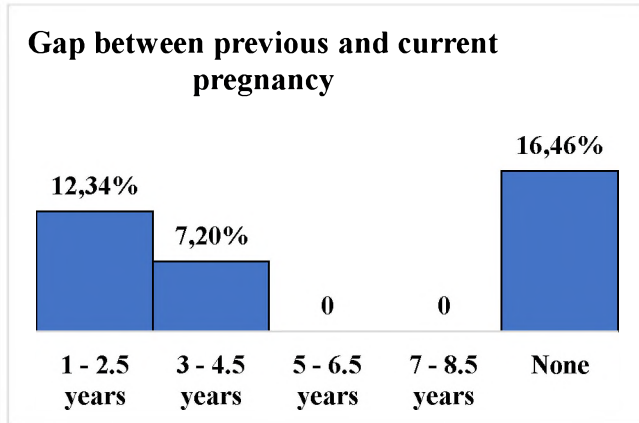
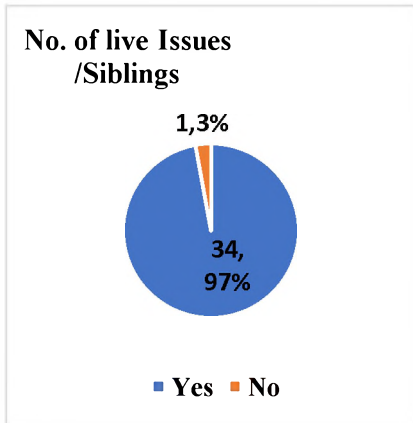
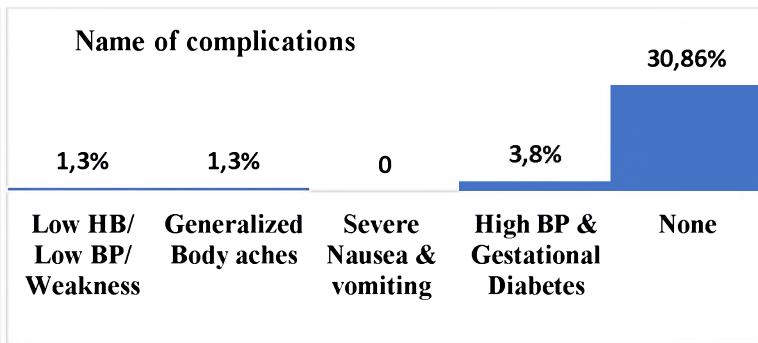
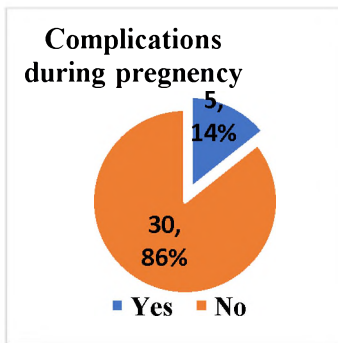
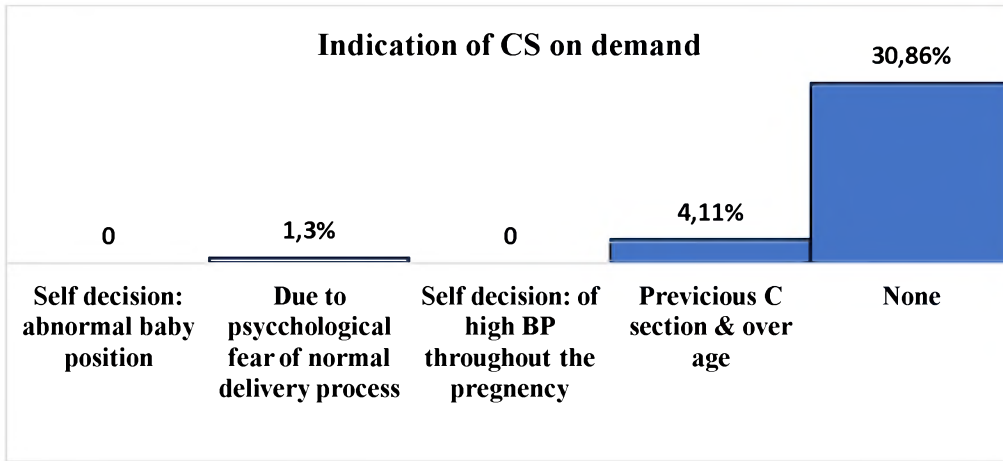


## Private Hospital (A)

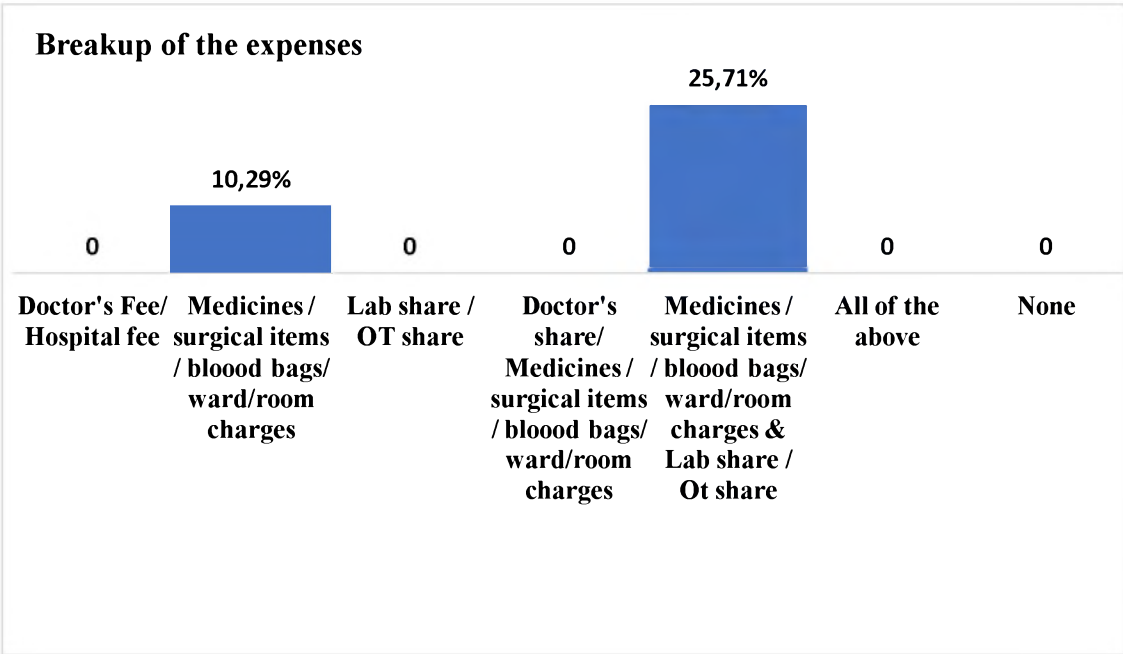
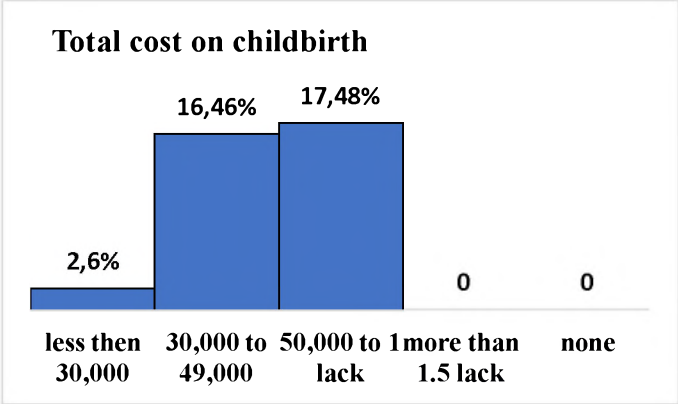




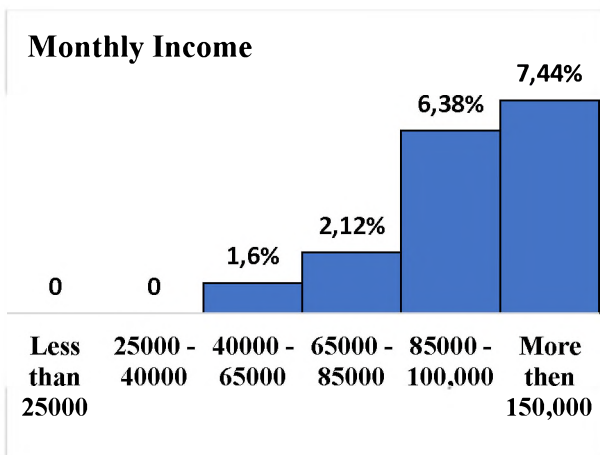
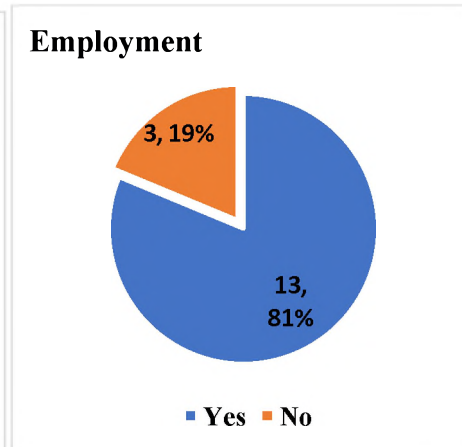
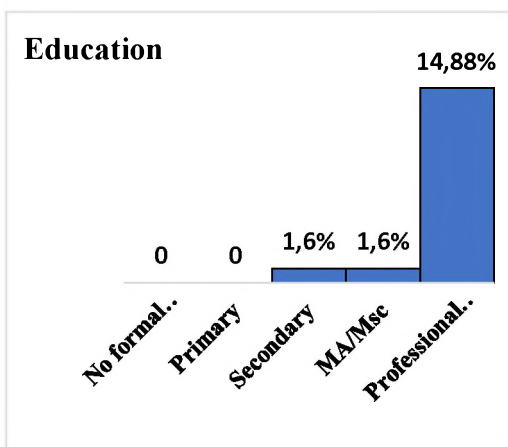
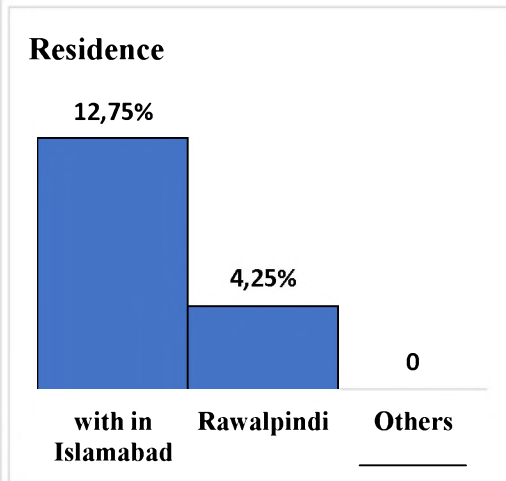
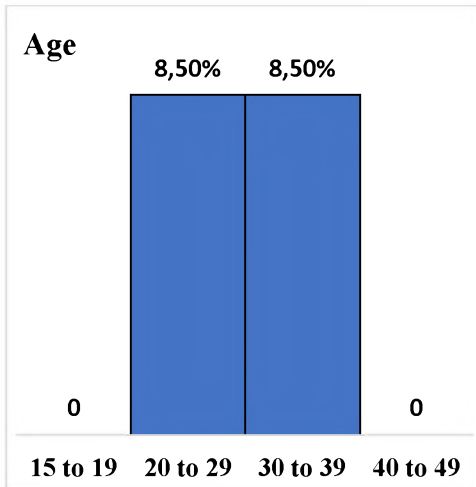




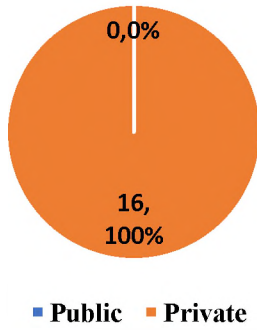




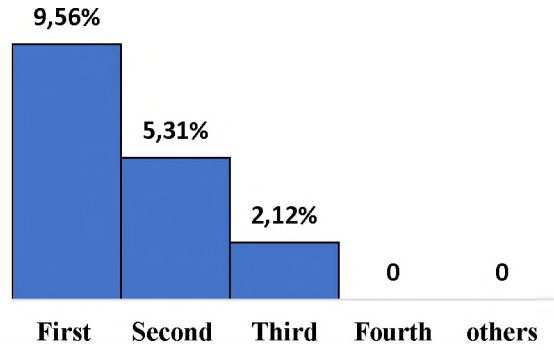
## Private hospital (B)



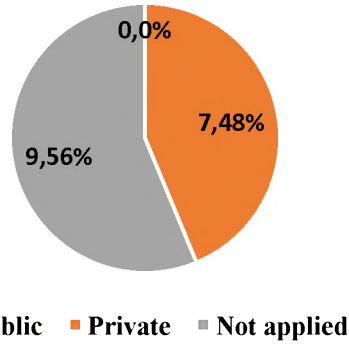
**Preference of hospital facility**



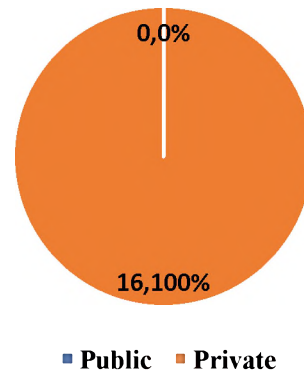
**Parity**



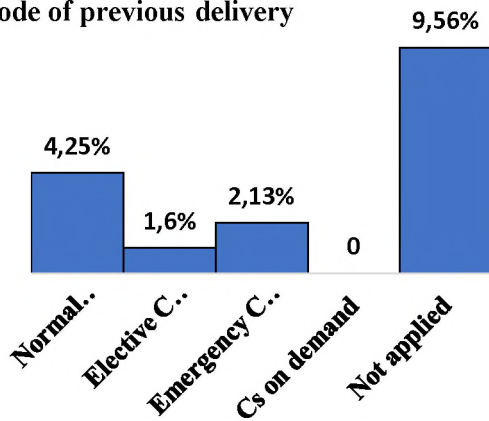
**Facility of previously delivery**



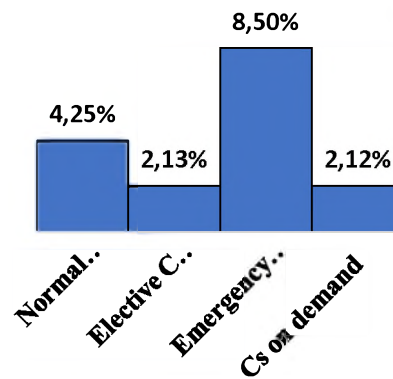
**Facility of current delivery**

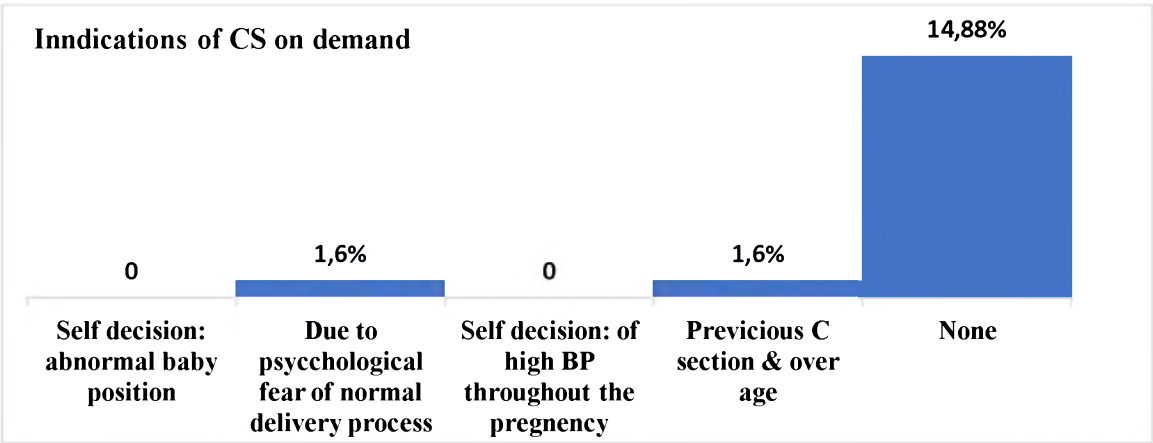
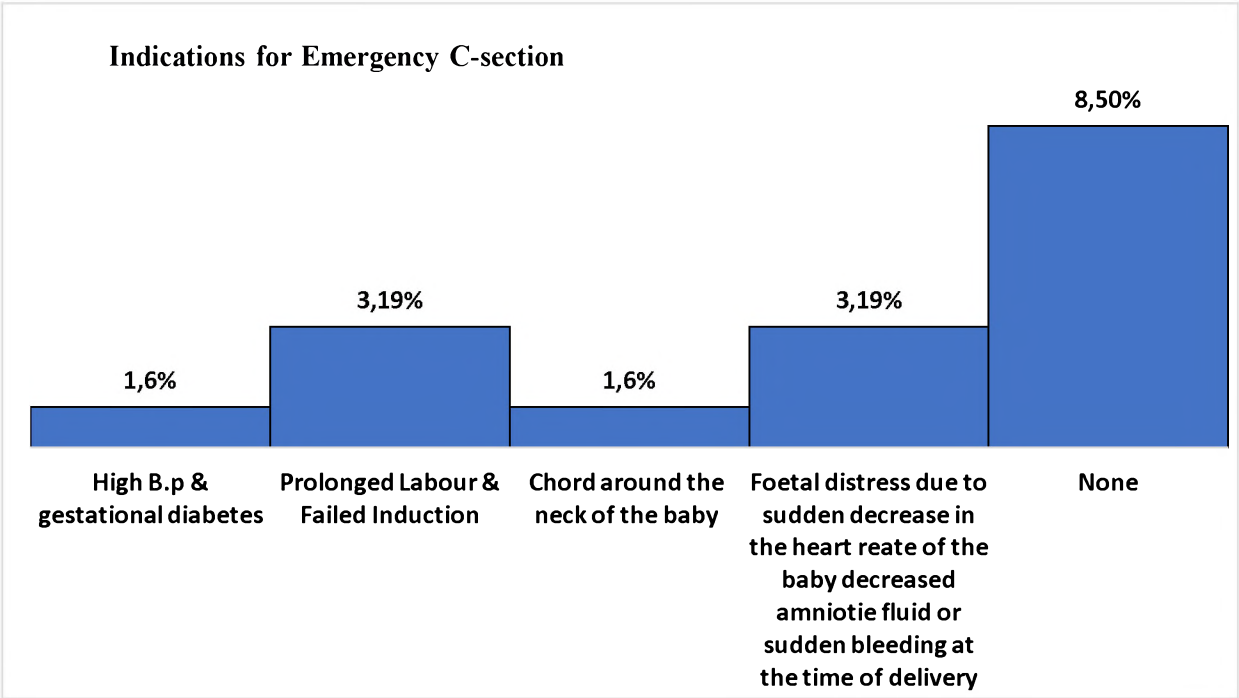


**Mode of previous delivery**

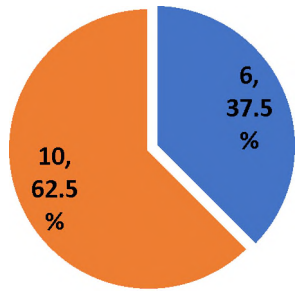


**Mode of current delivery**



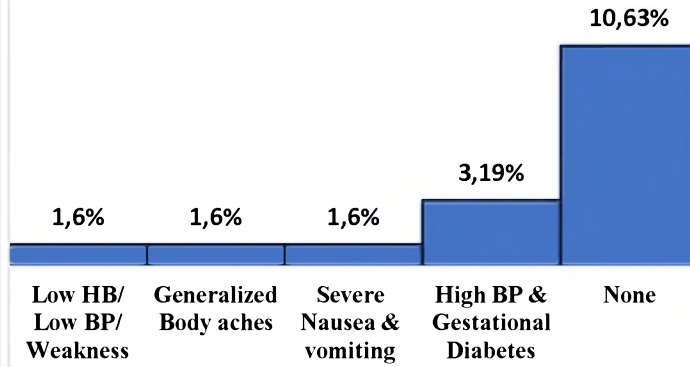


**Complications during pregnancy**

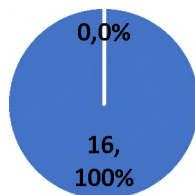


■ Yes ■ No

**Name of complications**

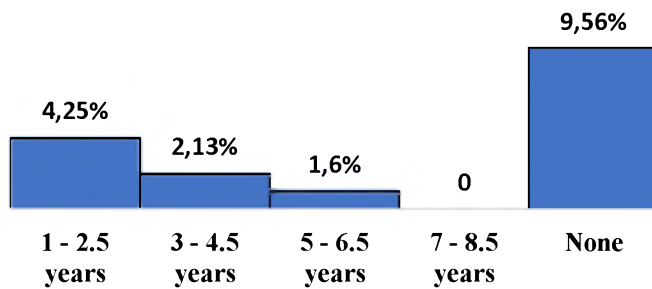


**No. of live Issues/ Siblings**

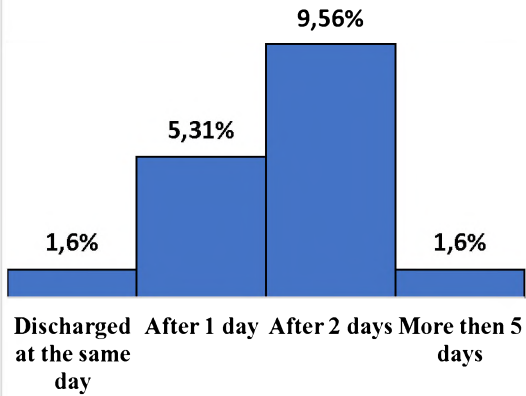


■ Yes ■ No

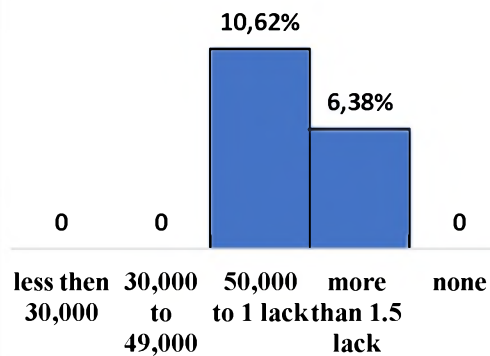
**Gap between previous & current pregnancy**



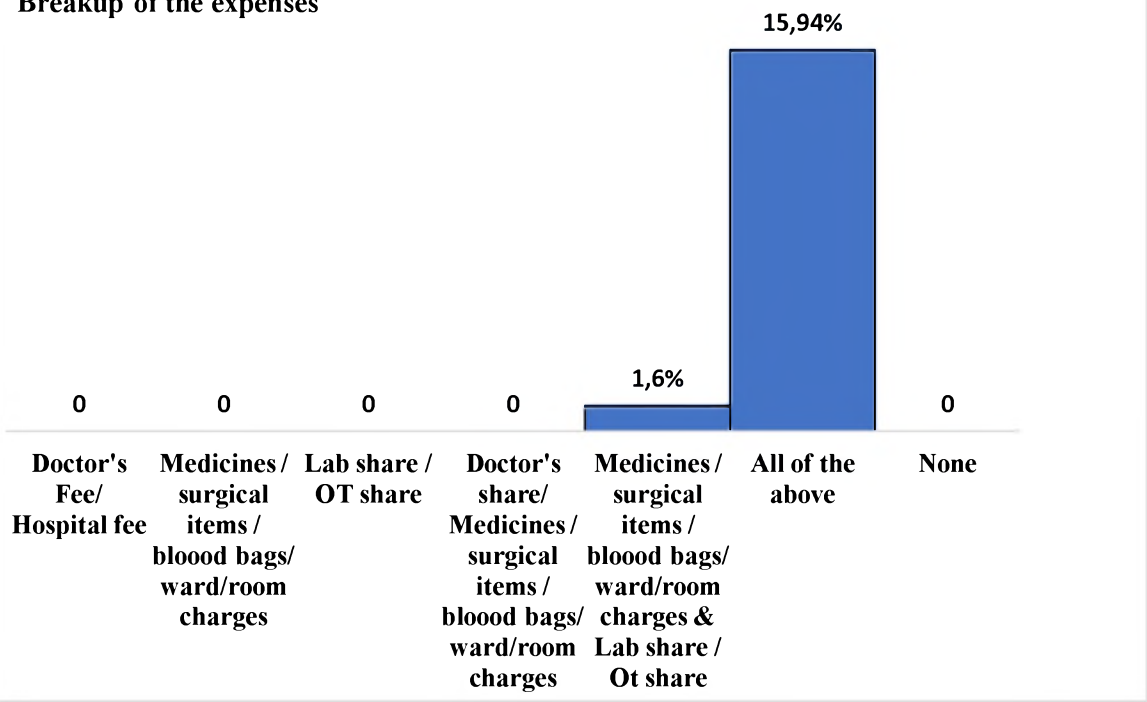
**Length of stay**



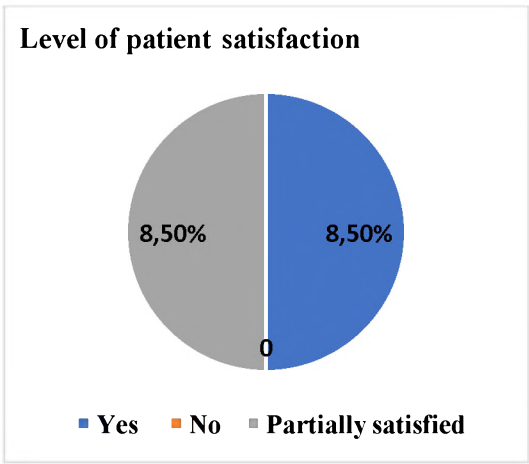
**Total cost on Child Birth**



**Breakup of the expenses**



**Level of patient satisfaction**



# ANNEXURE III: CONSENT FORM

## Consent Form

**Study Title:** “Opting for C-Section vs Natural Delivery: Understanding Factors, Influencing Choices, Practices and Cost”.

**Investigator:** Muhammad Adil Khan (M.Phil. Health Economics)

I confirm that the researcher has explained the elements of informed consent to the participant.

The subject knows that their participation is voluntary, and that they do not need to answer all questions. The purpose of the research as well as the risks and benefits have been explained. The procedures as well as the time commitment have been outlined. The participant understands issues of confidentiality.

Participant name: \_\_\_\_\_

Participant Signature: \_\_\_\_\_